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Engineering News-Record

A Consolidation of Engineering News, Engineering Record
The Sanitary Engineer and The Contractor

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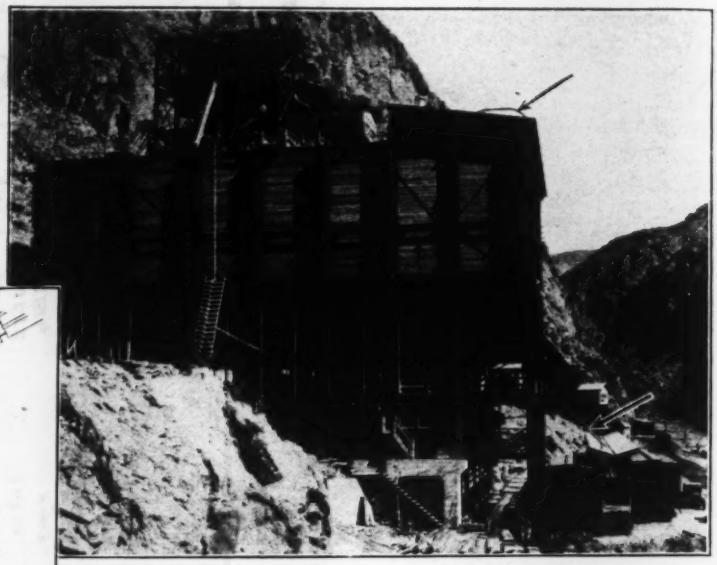
Published every Thursday. Price 25c. per copy. Subscription, domestic, Central and South America, $5 per year. Canada, including duty, $7.50. Foreign $9 or 45 shillings. Entered as second-class matter April 11, 1917, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U. S. A. Cable Address "MCGRAWHILL, New York." Member A.B.P. Member A.B.C.

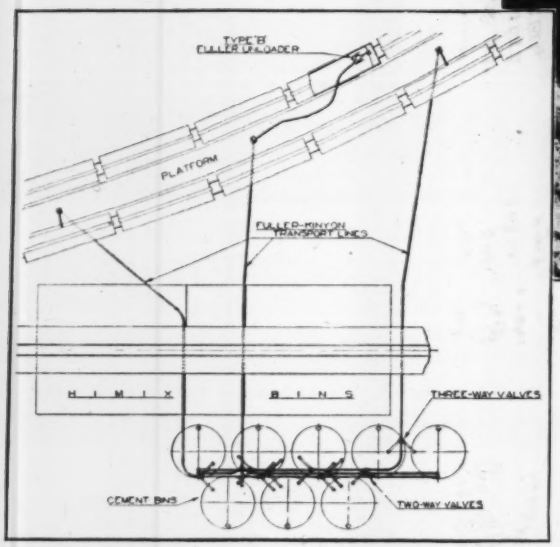
McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42D STREET, NEW YORK, N. Y.

Editorial and Publishing Offices: 330 West 42d St., New York; 520 North Michigan Ave., Chicago; 883 Mission St., San Francisco; Aldwych House, London, W. C. 2, England. Branch Offices: Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Greenville, S. C. James H. McGraw, Chairman of the Board; Malcolm Muir, President; James H. McGraw, Jr., Vice-President and Treasurer; Mason Britton, Vice-President; Edgar Kobak, Vice-President; H. C. Parmelee, Vice-President; Harold W. McGraw, Vice-President; B. R. Putnam, Secretary.

Another Pump and a new use for the Fuller-Kinyon Systems on

HOOVER DAM





(Above) Two Fuller-Kinyon Systems, with portable pumps were installed as original equipment to unload and convey bulk cement at the low-level mixing plant. The transport lines are indicated by the arrows.

(Left) The two original and one additional portable Fuller-Kinyon Systems will unload and blend four brands of cement at the new high-level plant. The systems are independent and each is provided with valves to control the flow of cement to any silo.

Some well-known current and recent projects, exclusive of highway construction, for which Fuller-Kinyon Systems handled bulk cement:

DAMS AND LOCKS

Allegheny Dam No. 2
Allegheny Locks Nos. 2 and 3.
Beauharnois, Quebec.
Hetch Hetchy.
Hoover Dam.
Kanawha River Lock and Dam.
Marmet, W. Va.
London, W. Va.
Thomas W. Koon Dam.
MacLaren, Quebec.
Madden, Canal Zone.
Marseilles, Illinois River.
Monongahela Dam and Lock No. 4.
Montgomery Lock No. 2.
Pine Canyon.
Svirstroy, U.S.S.R.
Wilmington.

BUILDINGS

Chicago Post Office.
Field Building, Chicago.
Merchandise Mart, Chicago.
Riker's Island Penitentiary.
Springswells Station, Detroit.
Santa Fe Depot, Oklahoma City.

BRIDGES

Golden Gate.
Mississippi River Bridge, New Orleans.
Missouri Pacific R.R. Carondolet, Mo.
Route 9w, Catskill, N. Y.
28th Street Bridge and Subway, Philadelphia.

MISCELLANEOUS

Bremerton Navy Yard.
Clyde Mallory Line Pier.
Jackson Street Pier.
Piers Nos. 92 and 107, New York.
Grain Elevator, Port of Albany.
Pennsylvania Railroad (Electrification, N. Y. to Baltimore).
Ward's Island Filtration Plant, New York.

The purchase of an additional Fuller-Kinyon System and the use of the original equipment at the new high-level plant are convincing evidence of satisfactory service. This is supplemented by the experience of fifteen other contractors who are now using from two to five Fuller-Kinyon Systems for unloading bulk cement. Many other contractors have used the same equipment on one job after another.

A unique feature of the high-level mixing plant is the arrangement for blending different brands of cement. The conveying systems are independent and each is provided with two and three-way valves to control deliveries to each of the eight storage silos. This operation is based upon the Fuller method used by many cement mills for blending dry raw materials. Note that each pump will unload two or three cars on each siding without moving the cars.

Our loose-leaf bulletin illustrates how the layout advantages of stationary and portable Fuller-Kinyon Pumps have been applied to reduce the cost of mixing and handling concrete at both permanent and temporary plants.

Fuller Company
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CEMENT BATCHERS — FEEDERS — BIN GATES
AIRVEYOR — PNEUMATIC CONVEYORS
AIR COMPRESSORS

Engineering News-Record

Vol. 110 New York, June 29, 1933 No. 26

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Shield-Driven Tunnels Near Completion Under the Schelde at Antwerp

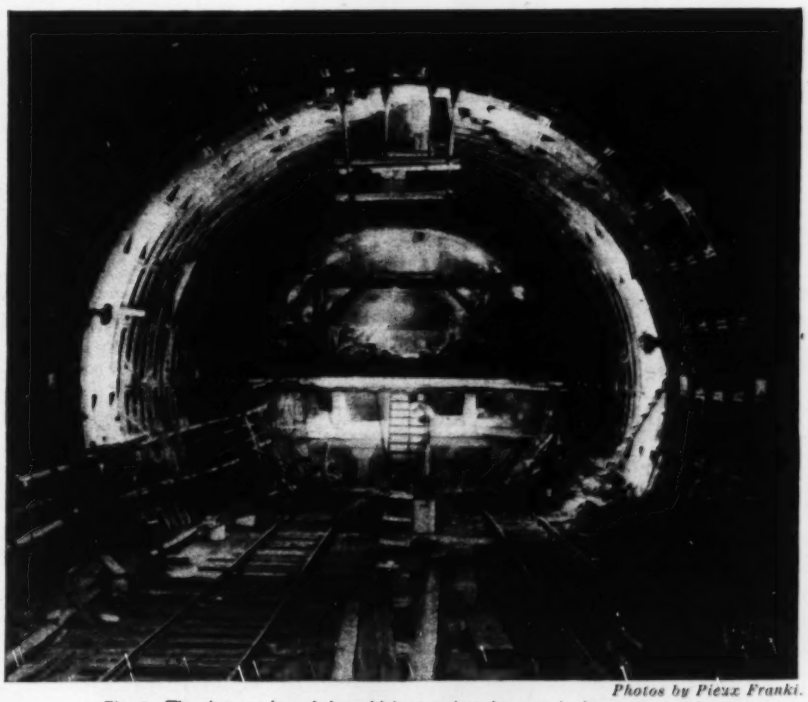
Vehicle and pedestrian tunnels built to open west river bank to commerce and industry—Design follows that developed for similar structures in this country

By S. A. Thoresen

Engineer of Designs, Parsons, Klapp, Brinckerhoff & Douglas, New York, N. Y.

TWO subaqueous tunnels, one for pedestrians and one for vehicles, at present are nearing completion under the Schelde River at Antwerp, Belgium. They are for the purpose of opening up the west bank of the river to development, a region close to the commercial part of the city but shut off from it by a busy navigable channel which cannot be bridged without undue interference to shipping.

Construction of the tunnels was begun early in January, 1931. A description of them and of the preliminary studies that led ultimately to the adoption of a plan for their construction, put forward by American engineers, was published in *Engineering News-Record*, June 18, 1931, p. 1,003. Briefly, the Belgium commission appointed to put the work under way called for proposals as to design and methods of construction and received some 60 alternate plans from firms in Belgium, Germany and France. On Jan. 8, 1931, contract for the work was let to Pieux Franki, of Liége, Belgium, upon plans prepared by the firm of Parsons, Klapp, Brinckerhoff & Douglas, designers of the vehicle tunnel at Detroit, and Ole Singstad, engineer of the Holland Tunnel at New York.



Photos by Pieux Franki.

Fig. 1—The river section of the vehicle tunnel at Antwerp is the conventional shield-driven cast-iron tube developed for subaqueous work in this country.

As will be seen by the accompanying drawings, the vehicle tunnel in general follows American practice; in details of some of its parts

and in some elements of construction it shows a notable departure from practice here and reflects the wide divergence in some construction practices existing between this country and Europe.

The vehicle tunnel lies to the north of the center of the city where its east portal is close to the docks and gives direct access to the principal north-and-south avenue running through the city. In this location, it was possible to bring the east approach to the surface under a wide street that now occupies the site of a former canal.

The pedestrian tunnel, served by both elevators and escalators, is located close to the center of the city.

Vehicle tunnel

The distance between portals of the vehicle tunnel is 5,801 ft., and the total length between street grades is 6,923 ft. The alignment is straight except for two short curves at the east portal. In profile the tunnel has descending and ascending grades of 3½ per cent; for a short distance under the river the grade is reduced to 1 per cent.

The width of the roadway throughout the tunnel is 22 ft. 2 in., practically the same as the roadway in the Detroit tunnel, and 2 ft. more than the width of the roadway in the Holland tunnel. From the portal to the street grade the roadway width is increased to 29 ft. 6 in. One one side is a narrow sidewalk for patrol purposes. The headroom from roadway to ceiling is 14 ft. 8 in. as compared with 13 ft. 6 in. in the Holland and Detroit tunnels. A fresh-air duct is provided below the roadway and an exhaust air duct above the ceiling, following normal practice, and facilities are provided in the walls for signals and telephone systems, lights, water and fire protection.

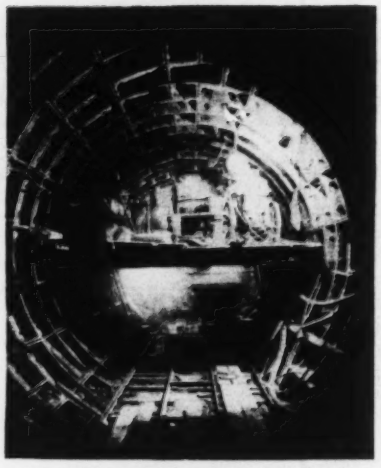


Fig. 2—The pedestrian tunnel is similar in design to the river section of the vehicle tunnel but is of small diameter.

As will be seen from the drawing, the shield-driven section under the river is the conventional cast-iron tube used in shield-driven tunnels in this country. The open-cut approach sections, however, depart from current practice here in that they are of reinforced concrete rather than of the conventional structural-steel and concrete box-type structure common to subway work. A similar departure from current American practice is found in the two ventilating buildings for the vehicle tunnel, which have reinforced-concrete frames instead of structural-steel frames. For the smaller buildings serving the pedestrian tunnel a structural-steel frame was used.

Fig. 3—The vehicle tunnel at Antwerp is of nearly straight alignment through water-bearing sand and dense clay. The reinforced-concrete sections at each end were built in open cut, and the cast-iron section under the river was shield-driven, using one shield and working from the west end.

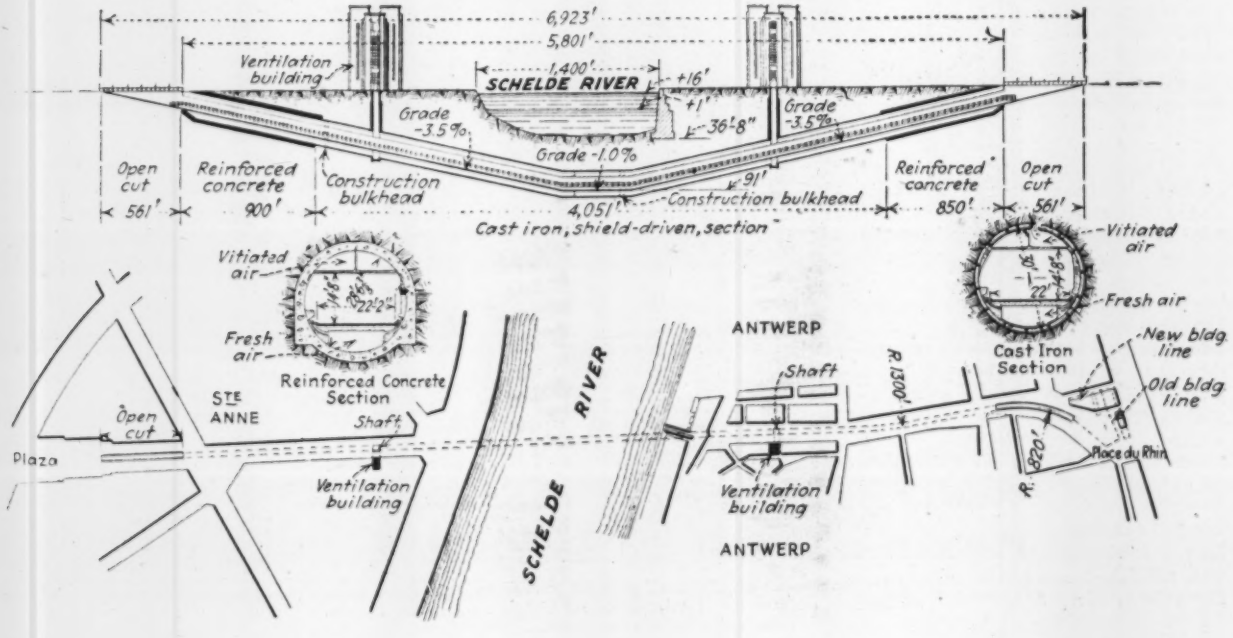
The open approaches on both sides of the river consist of a conventional reinforced-concrete structure with retaining walls and floor designed to resist a combined soil and hydrostatic pressure. On the east and west banks the structure is supported by Franki piles on account of the compressible nature of the underlying materials. The walls are waterproofed by the membrane method to protect against seepage.

The concrete tube is reinforced against both thrust and bending. Its thickness varies from 2 ft. at the portals to 3 ft. 3 in. at the junction with the cast-iron section. In order to obtain added strength as well as to facilitate construction, the walls are made vertical from the springing line of the arch to a point determined by the angle of repose of the excavated material. A bituminous membrane waterproofing protected by a single or double layer of brick envelopes the entire tube. Each invert with its longitudinal reinforcing is continuous except for construction joints, while the arch has contraction joints, with copper-plate water stops, spaced about 65 ft. apart.

The cast-iron tube is composed of bolted rings, each ring formed of fourteen segments, 6 ft. 10 in. x 2 ft. 6 in. wide, and one key piece. The skin thickness is 1¾ in., and the longitudinal and circumferential flanges are 2½ in. thick at the base tapering off to 2 in. Bolts are 1¾ in. in diameter with grommets and washers under the head and nut. Conventional calking grooves 1¼x⅜ in. were provided for lead calking around the edges of all longitudinal and circumferential flanges.

Ventilation

The ventilation shafts are rectangular in plan, built of reinforced concrete,



with exterior walls varying from 6 ft. 6 in. at the bottom to 3 ft. 3 in. at the top. They are waterproofed with a bituminous membrane protected by brick. Circular openings were left in the walls to permit the shield to pass through, and subsequent to passage of the shield a special joint was provided between the shaft and the tube to prevent leaking. In addition to the ventilating ducts, each shaft contains a stairway, the power feeders and a drainage sump with pumps.

From both shafts horizontal structures under the street carry the ventilation duct to the ventilation building set back of the street line. The ducts are of reinforced concrete molded to minimize friction.

Each ventilation building is equipped with six blower and six exhaust fans, two-thirds of the equipment for present needs and one-third for a future increase in traffic. Four blower and four exhaust fans in each building will provide adequate ventilation for the maximum traffic to be expected under present conditions, estimated at 1,000 vehicles per hour. Each fan has a capacity of 80,000 cu.ft. per minute, thus giving a total of 640,000 cu.ft. of fresh air per minute, exclusive of the reserve fans.

Each fan is driven by two electric motors mounted on one shaft and so controlled that variable speeds may be obtained to meet traffic demands. The operating voltages is 400, and power is supplied by two feeders on each side of the river to insure uninterrupted service. Interconnection is provided between the buildings in case of failure of the current on one side of the river.

Progress of construction

The nature of the soil through which the tunnel was driven is principally sand, saturated and of quicksand consistency. Near the street surface there is some 14 to 20 ft. of sand fill, then a turf layer and below that quicksand, with a small amount of clay near the permanent clay stratum, which is 86 ft. below street level. The underlying clay is exceedingly hard and impervious and of excellent quality for tunneling purposes. The allowable load upon it varies from 5 to 8 tons per sq.ft., while the maximum load on the quicksand is less than 1 ton per sq.ft. The roadway at its maximum depth is 91 ft. below mean low water, and for a distance of 2,000 ft. the tunnel invert is entirely in clay.

Both the walls for the approach cut and the concrete tube on the west bank were built in an open trench, dug in part by a bucket excavator having a capacity of 1,700 cu.yd. per eight-hour shift. Where the cut exceeded a depth of 46 ft., a dragline and clamshell bucket was used. About 200,000 cu.yd. of material was removed from the cut.

The first and second cuts were carried to a depth of 23 ft. each, with sloping banks, while the last cut, having a maximum depth of 20 ft., was retained by steel sheetpiling.

An interesting feature of this deep cut was the use of well points to unwater it. In the first analysis it was discovered that practically two water levels existed, one above the original turf level and another below, as shown in the accompanying drawing.

The sand above the turf layer was unwatered partly by the use of well-point screens connected to a central pumping plant and partly by discharging into a drainage ditch at the turf level. Two sets of screens were used for the pumps, an outer coarse screen and an inner fine one placed inside a pipe and surrounded by pea gravel and coarse sand to prevent clogging. The number of well points used was the function and the character of the sand and the hydrostatic head, both of which were subject to predetermination.

Where the depth of the cut increased

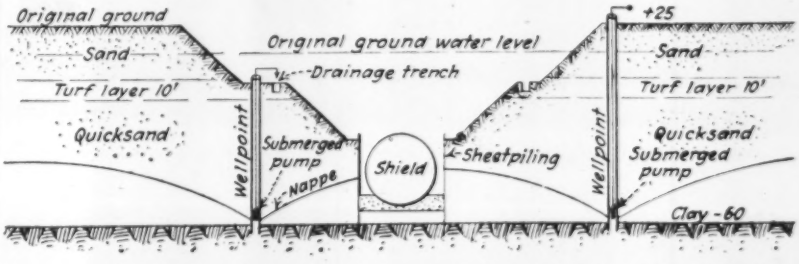
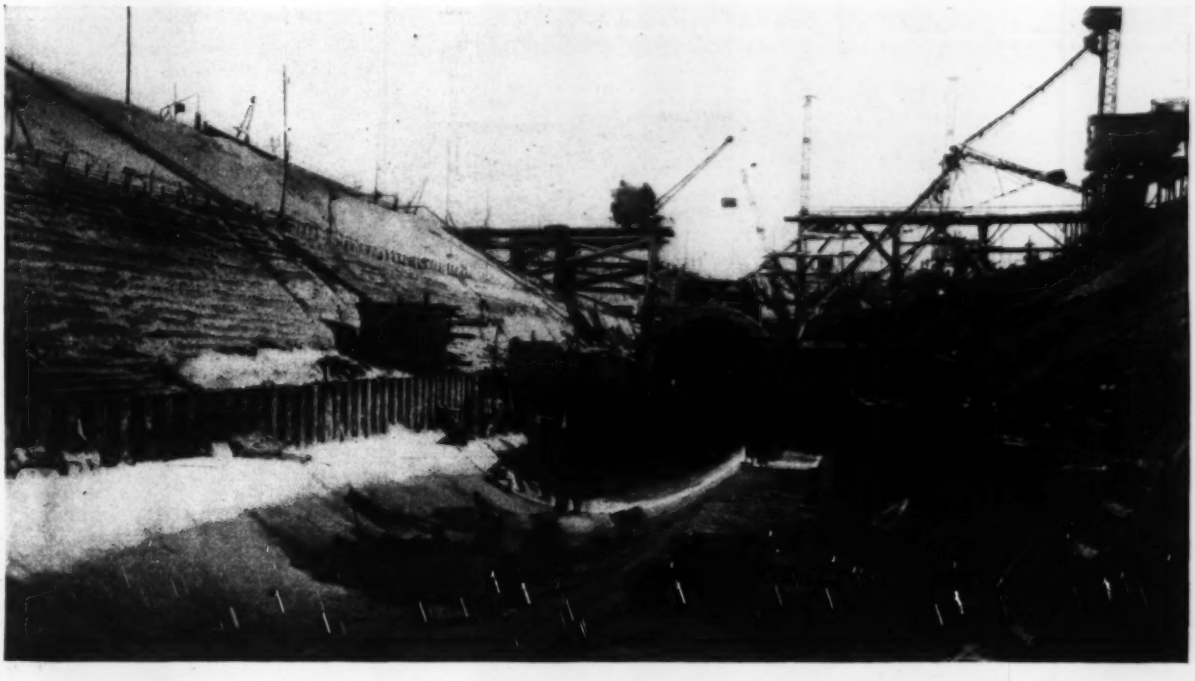


Fig. 5—By the use of well points and tight sheetpiling much of the west approach to the river was built in the open. The shield for the driven section was erected in this open cut.

Fig. 4—At the west end where the land was unoccupied the reinforced-concrete section of the tunnel was built in a wide open cut made free of water by an elaborate system of well points.



beyond the lift of the pump, a somewhat different installation became necessary. Here a series of bored holes was sunk, the spacing varying from 15 to 60 ft., and in each a steel casing about 20 in. in diameter was sunk and driven into the underlying clay stratum. Inside this tube was inserted a second tube 10 in. in diameter, the lower end of which was made up as a filter consisting of a perforated tube and a coarse galvanized wire netting surrounded by a fine metal gauze having 2,000 meshes to the sq.in. The annular space between the outer and inner casing was filled with pea gravel and coarse sand, and the outer casing then was withdrawn.

Within each inner tube was placed a specially designed pump whose electric elements operated submerged. It was 8 in. in diameter and 30 in. long and had a maximum capacity of 75 gal. per minute. These pumps were driven by 5-hp. motors and were guaranteed to work without interruption for one year, provided lubrication was furnished occasionally. The discharge pipe was 3 in. in diameter. A waterproof cable connected the pump with the electric supply.

When the pumps were in action the groundwater filtered through the gravel and screens to them and was discharged to a network of drains located on the surface. The efficiency of the system was such that the groundwater level was lowered to a depth of 45 ft. below the original level.

Such a well-point system was installed on both sides of the river adjacent to the deep cut; at the west side it was extended into the river, straddling the cast-iron section of the tunnel to reduce the air pressure required during the interval of driving the shield from the open cut until it was buried in the clay.

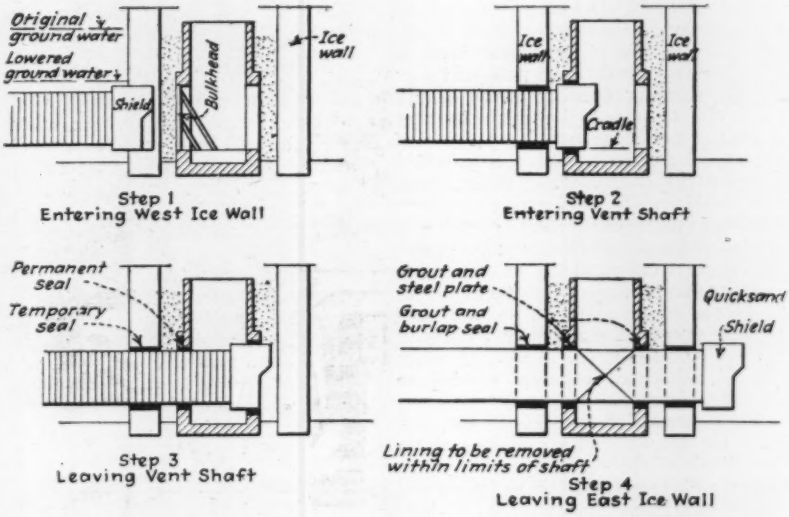


Fig. 7—The shield-driven section of the tunnel was carried through the ice wall surrounding the west ventilation shaft and through the shaft itself by the method here shown.

Shaft sunk by freezing

The two ventilation shafts, identical in design, were built within cylinders of frozen ground extending down through the water-bearing strata and sufficiently strong to withstand the combined earth and hydrostatic pressure. By this process it was possible to attain a shaft 70 ft. in diameter and 87 ft. deep entirely free from bracing.

For freezing the cylindrical cofferdam, 116 holes were bored, one set on a circle of 86-ft. diameter and the second on a circle of 78-ft. diameter, with a circumferential spacing of the holes of 4½ ft. Each hole was sunk to the clay stratum about 90 ft. below ground level, and in each a steel pipe 6 in. in diameter was sunk and sealed at the bottom. Inside this outer pipe was inserted a second pipe 2 in. in diameter and open at the bottom to form a freezing circuit through which a brine solution was passed to reduce the temperature of the ground to the freezing point. Subsequently the temperature was lowered far below the freezing point until a solid ice wall of the desired thickness and strength was formed.

The period required for freezing the ice wall was about four months, and the wall was maintained in a frozen condition until the concreting of the shaft had been completed.

Fig. 6—Shafts for the ventilation ducts were built in the open within cofferdams of frozen soil. The annular chamber here shown is for the piping for the freezing system. The tops of some of the vertical pipes of the brine-circulating system may be seen.

Shield-driven tunnel

About 4,000 ft. of the tunnel was driven by the shield method, erecting the shield in the open cut at the west end and driving it through under the river to the open cut on the east side, passing it through both ventilating shafts en route.

The shield was of conventional American design, and its equipment and hydraulic pumps were furnished by the Watson-Stillman Co., of New York. It had an outside diameter of 31 ft. 6 in. and a skin-plate thickness of 2¾ in., with a clearance between the outside of the iron and the inside of the tail of 1½ in. measured radially. The length of the shield over the hood was 18 ft. and along the bottom 16 ft. Its total weight was 300 tons. The hydraulic equipment of the shield consisted of 30 jacks with a combined shoving capacity of 9,000 tons.

Progress of work

Excavation of the open cut on the west bank commenced on April 1, 1931, and was completed on Aug. 1, when the installation of the shield commenced. Simultaneously, the compressor plant,

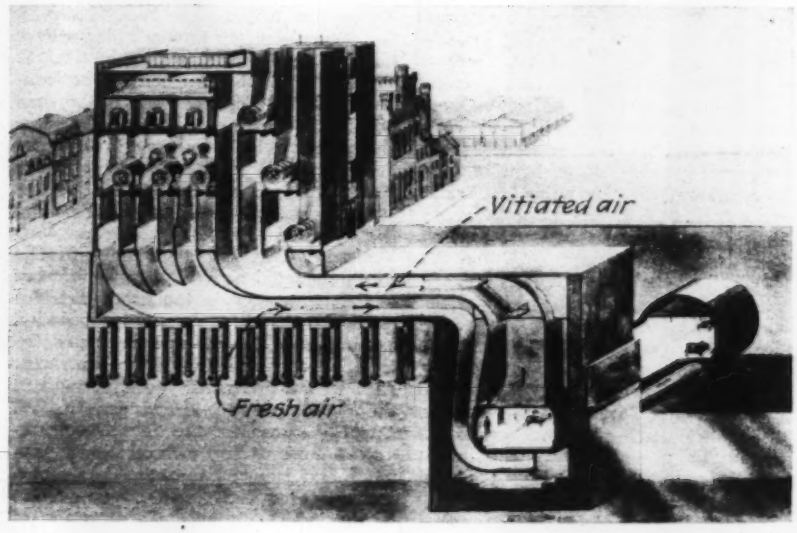


Fig. 8—The ventilation buildings for the vehicle tunnel are set within the building line, with ducts of reinforced concrete extending out to the shaft under the street surface.

freezing plant and other auxiliary structures were erected. The first shove of the shield took place on Nov. 9, 1931, and holing through occurred on Feb. 28, 1933. The distance covered with one shield was 4,000 ft. in 400 working days, an average of four rings or 10 ft. per day. The maximum progress recorded was nine rings or 22.5 ft. in a 24-hour day, which is believed to be a record for a cast-iron tunnel of this diameter driven through a combination of extremely hard clay and quicksand.

Two compressed-air bulkheads were installed in the tunnel, one west of the ventilation shaft near the point where the shield was erected and the second at the low point of the tunnel to the west of the 3½ per cent upgrade. The distance between the bulkheads was about 2,000 ft. Muck and construction material were handled by cableway west of the river bulkhead and by battery locomotives to the east of the bulkhead.

Extreme care was exercised in driving the shield under the quay wall at the east side of the river, with the result that no settlement of the wall was reported.

The average air pressure maintained during the shield operation was 18 to 20 lb., while the maximum reached was 30 lb. Such low internal air pressures were made possible by the use of well points to reduce the external hydrostatic pressure close to the river bank and beyond the river bank at the west side.

Air pressure was adjusted to synchronize with the tide as soon as the shield had passed beyond the last well point. When the shield was entirely buried in clay, the air pressure was lowered slightly, and no blowouts occurred during its passage from one bank to the other.

Driving through the shaft

Driving the shield through the shell of ice surrounding the west ventilation shaft and through the two circular openings in the permanent shaft without the use of compressed air, and with the groundwater level almost to the top of the shield, presented an unusual problem. The problem was solved in the following manner:

Upon arrival of the shield at the west face of the ice wall the freezing process was stopped and the ice excavated to within 5 ft. of the inside face (Fig. 7). Meanwhile the space between the inside face of the ice wall and the outside face of the permanent shaft had been filled with clay and the circular openings in the permanent shaft bulkheaded. The shield then was shoved through the remaining section of the ice wall and through the clay backfill until it landed upon the cradle of steel beams within the shaft, shown in Fig. 10. The air pressure was removed at the moment the shield passed through the ice wall, and an effective seal consisting of thick grout and burlap bags packed into the annular space between the cast-iron lining and the ice wall prevented groundwater from seeping into the shaft. After the shield had passed through the circular opening in the permanent shaft, a watertight closure was made by the injection of grout and, ultimately, by a structural diaphragm.

The shield was pushed through the shaft to the east ice wall, and the cast-iron sections were erected behind it so that compressed air could be used again as soon as the shield passed through the ice wall into the fluid quicksand to the east of it.

After the river bulkhead had been installed in the tunnel and the air pressure between the two bulkheads could be re-

Fig. 9—Both elevators and escalators connect the pedestrian tunnel with the street surface.

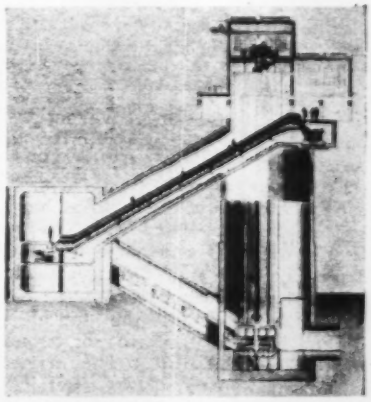
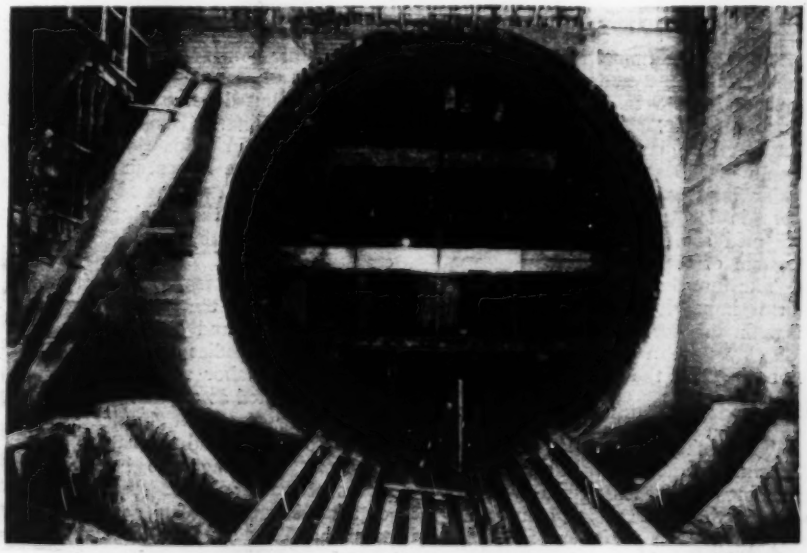


Fig. 10—The shield was pushed through the ventilation shafts on a cradle of steel I-beams. Its great size is indicated by the man standing in front of it.



duced to normal, the cast-iron lining in the shaft was removed to permit the construction of the air ducts.

The method adopted for passing the shield through the east shaft differed from that here described to the extent that an air bulkhead provided with a manlock was installed in the shaft, and the shield passage was effected by the aid of well points under a moderate air pressure of 10 lb.

Tunnel lining

At the present time the cast-iron portion of the tunnel is being lined with concrete, the work being prosecuted simultaneously from both ends so as to reach completion during the summer. A deviation from general practice is the construction of the ceiling slabs in precast units 11x4 ft. x 3½ in. thick. The outer edges of these slabs are set in a continuous slot in the side wall, and the center is supported on a pair of steel angles.

Setting the tiling of the walls and paving the tunnel with granite blocks, together with the installation of mechanical and electrical equipment in the tunnel and ventilation buildings, is in progress, and it is hoped to have the tunnel ready for operation some time late this year, practically six months in advance of the scheduled opening date.

Pedestrian tunnel

The pedestrian tunnel is designed both for those who would cross the river on foot and those who use bicycles as a means of conveyance. Its principal elements are a small subaqueous tunnel connecting two shafts close to the water's edge in which are elevators supplemented by a double-file escalator for use during rush hours.

The alignment of the tunnel is straight between the two shafts, and its length is 1,750 ft. The original plans called for the use of steel liner plates in driving the subaqueous section, but further study showed little if any gain over the more conventional cast-iron lining, and so the latter was adopted. The tunnel is finished on the inside with concrete to an interior diameter of 14 ft. 9 in., with a walkway 12 ft. 6 in. wide. The main shafts have an interior diameter of 38 ft. and a depth of 120 ft. An intermediate circular landing platform for the escalators is located underground and has inclined shafts leading to the top and bottom of the main shaft.

The tunnel itself was driven through firm impervious clay for its entire length, the overlay consisting of 10 ft. of clay with a variable depth of fine sand between the clay and the riverbed.

Pedestrian tunnel construction

The sinking of the shafts and other auxiliary structures such as the escalator landings was accomplished by the freezing method. Two ice cylinders were frozen at each shaft, one for the main elevator and one for the escalator landing, and they were connected by two outer straight walls and one central wall, closing off the space in which the inclined shafts for the escalator were built. The three straight ice walls joining the two cylinders were braced during the process of excavation, and the escalator galleries were erected in open trench.

Work on the pedestrian-tunnel shaft commenced on June 28, 1931, and the tunnel was holed through on Nov. 30, 1932. Concreting of the shaft and the inclined escalator galleries was completed in advance of concreting the tunnel, the latter being finished during the month of February, 1933. The mechanical installation, which includes two elevators, two double-file escalators and auxiliary equipment, will be in working condition so that the tunnel can be opened in the early fall.

The total cost of the entire project exclusive of real estate will be about 250,000,000 francs.

The two tunnels are being built by the Société Intercommunale de la Rive Gauche de l'Escaut, of which F. P. Thonet is chief engineer. The contractor for the entire work is the firm of Pieux Franki, Liége, Belgium. Negotiations looking toward the participation of American engineers in the design contests were made by Walter J. Douglas, of the firm of Parsons, Klapp, Brinckerhoff & Douglas, New York, and that firm together with Ole Singstad acted as consulting engineers to the contractor in the preparation of plans, proposals, design and ventilation equipment. The writer represented the firm in cooperation with the contractor both in the preliminary designs and in the detail contract drawings. F. W. Barnes represented the firm as consultant on construction methods and equipment, and Harry Talbot acted as superintendent for the shield-driven section of the vehicle tunnel. Construction of the pedestrian tunnel was under direction of the contractor's own engineers.

Sewers and Water Mains Laid by Relief Labor

Oklahoma City spends $750,000 on an unprecedented amount of hand labor for long-needed public works, including 13.7 miles of sewers and 16.5 miles of water mains—Property owners pay cash for sewer materials

By L. M. Bush
City Engineer, Oklahoma City, Okla.

DURING the past two years Oklahoma City, Okla., has conducted an extensive program of employment for the relief of those whose ordinary occupations have been discontinued. Unemployment has been unusually acute because the large oil field within and adjacent to the city has been practically shut down. Also thousands of people ordinarily employed in the cotton and grain fields flocked to the cities of the state in search of employment.

Authorities of the local government met this condition by setting up an unemployment relief committee of five, consisting of one member each from the county, the city, the community chest, the civic clubs, and one at large from all the various bodies and organizations, including the labor unions. The committee has acted as a general coordinating agency over all branches, with power to recommend the nature of employment, the wages to be paid, the hours of work and the general policies of administration. Under its guidance there has been set up a director of unemployment relief, who with his staff has supervised the selection of all registrants for work. His department is financed jointly by the city and the county and is housed in an independent location some distance from the city hall and the county court house.

The director has registered the various applicants for work and has assigned them in classes, according to the number of dependents involved in each case. Case workers investigate the actual needs of the applicant and his fitness for various classes of employment. Registration during the winter of 1931-'32 reached a maximum of 14,000, and during this last winter it increased to almost 18,000.

During the earlier stages of the program wages and working hours were left largely to the administrative officer in charge of the program. At the start of the program, wages of 40c. per hour were paid for all classes of work. This rate was soon found to be too attractive and resulted in a large influx of applicants from other localities. At the start of the 1932-'33 relief program a wage of $6.25 per 30-hour week was established. This wage, while admittedly unreasonably low, had the desired effect

of discouraging many newcomers, and yet was sufficient to provide the bare necessities for a family during the winter months.

The administrative officers in each case call upon the director for the quota of men desired for any particular project. These men are then examined by the city or county physician to determine their physical fitness to do the work involved. If found to be physically unfit for the work, they are assigned to some other department where the work would not require such strenuous effort. The principal users of this labor have been the county on its road program and the city park department, the city water department and the city engineering department.

For the fiscal year ending June 30, 1931, the city expended $50,000 on its unemployment relief program. For the year ending June 30, 1932, this sum was increased to $100,000. For the current fiscal year ending June 30, 1933, the city's appropriation was $250,000. Oklahoma County also appropriated $250,000 for unemployment relief, thus providing a total of $500,000 of local funds for this year's relief work in this community. In addition to these appropriations, the R.F.C. relief loans became effective Nov. 1, 1932. Since this date the city and county combined have used $100,000 of R.F.C. funds per month to supplement their own relief work. The men employed on the R.F.C. work are not subject to physical examination. A large number of women are employed in sewing rooms and are paid out of the R.F.C. funds.

This extensive program in providing labor exclusively has thrown a volume of hand work upon the various departments affected, which is unprecedented in this vicinity. Many of those in charge were rather dubious about the construction of commonly called machine projects by hand labor. The results, however, have been rather astonishing. The engineering department constructed a total of 12.6 miles of sanitary main and lateral sewers and 1.1 miles of storm sewers up to April 22, 1933. All of these projects were in localities where a large amount of shale was encountered, making excavation by hand quite difficult. The depth of cut ranged from 6 to 20 ft. In addition to the sewer work, there has been a large amount of general construction such as bridge and culvert work, electric-signal installation, drainage ditches, miscellaneous construction at the municipal airport, gas lines, channel and levee work along the North Canadian River, which flows through the city, and the setting back of radius curbs at dangerous street intersections. Some 350,000 cu.yd. of dirt has been moved in building levees and straightening the channel of Lightning Creek, a tributary of the North Canadian River. This dirt was all moved by loading with shovels into wagons and transporting by teams.

LINEAR-FOOT COST OF CAST-IRON WATER-MAIN EXTENSIONS IN OKLAHOMA CITY BY CONTRACT AND BY DAY LABOR

	2-in.	6-in.	8-in.	12-in
1929 by contract				
1,990-ft. mains....	.....	.....	.....	$2.65
1930 by contract				
2,602-ft. mains....	$0.83	.....	.....	.....
8,668-ft. mains....	.....	$1.53	.....	.....
1931 by hand labor				
400-ft. mains.....	$0.59	.....	.....	.....
19,226-ft. mains...	.....	$1.38	.....	.....
1932 by hand labor				
4,136-ft. mains...	$0.40	.....	.....	.....
74,016-ft. mains...	.....	$0.88	.....	.....
7,499-ft. mains....	.....	.....	$1.28	.....
1,000-ft. mains....	.....	.....	.....	$2.00

The water department has laid 16.5 miles of water mains, the work being completed at a remarkably low cost. Figures in the accompanying table for 1931-'32 are for work done by the water department, using hand labor, and for 1929-'30 are for work done under contract by private contractors.

Sanitary lateral sewers had heretofore been built exclusively by contract under the state law, which provides for special-assessment tax warrants being issued against the abutting property. The drop in bond prices throughout the country made it virtually impossible to let contracts for this class of work. A plan was devised for constructing these sewers, wherein federal-aid labor was used, with the property owners paying for the materials required in their construction. More than 100 blocks of lateral sewers have been completed, and the program is now being extended to other parts of the city where sanitary sewer service is not available. This method of construction has resulted in property owners securing sewers at a cost of about $10 per 50-ft. lot, where as the average cost of similar sewers constructed under the special-assessment contract method has previously been from $90 to $100 per 50-ft. lot. It is rather doubtful whether the special-assessment method of construction can be resumed in the near future in the face of the substantial saving shown under existing conditions by paying for the materials in cash.

Of the sanitary sewers 33,010 ft. were 8 in.; 6,915 ft., 10 in.; 4,715 ft., 12 in.; 3,954 ft., 15 in.; 3,559 ft., 18 in.; 1,761 ft., 21 in.; 2,371 ft., 24 in.; 249 ft., 27 in.; 3,726 ft., 39 in.; and 6,324 ft., 42 in. The storm sewers ranged from 15 to 48 in. pipe and 3x6 ft. to 6 ft. 10 in.x7 ft. 3 in. in conduit. The total cost has been $241,882, of which the material was $111,063, city labor $87,368, and federal labor $43,451. Thus labor received 54 per cent of the whole.

On 27 miscellaneous jobs on which quantities were not figured $121,136 was spent, of which $25,568 only was for material, $33,022 for city labor and $62,545 for federal labor, thus giving labor 79 per cent.

Recently the program has been enlarged to cover street widening. The plan for this work is the same as for sewers—that is, the property owners are to pay for the required materials. This plan has effected a substantial reduction in costs over the special-assessment contract method for this class of work.

The setting back of 143 radius curbs, particularly on narrow streets, with the resultant increase in area within the intersection, has proved highly popular with the motoring public. A total of $14,136 of public funds has been expended in the purchase of materials for this work, and $6,443 has been spent for labor. The improvement has resulted in a large decrease in traffic accidents at these corners. The program will be extended throughout the city as rapidly as funds for the purpose are made available.

The park department has completed an extensive improvement program over the park system throughout the city. Most of this work has involved landscaping, construction of shelter houses, golf courses, public playgrounds, swimming pools, tennis courts, baseball diamonds and automobile parking facilities for the general public. While this program covered the 52 parks throughout the city, the work was concentrated on the larger playground areas where a maximum of population could be served.

At the beginning of this general made-work program, there were numerous accidents to inexperienced laborers. However, as the program progressed, the number of accidents decreased rapidly, and in the last few months they have reached almost negligible proportions. During the first few months numerous cases of faked injuries had to be weeded out and the registrant placed on the black list. As soon as it became generally known that the faking of injuries meant blacklisting of the guilty applicant, such malpractice decreased rapidly.

Our program has been highly popular with the citizenship in the definite results that have been shown. Dozens of small but long-needed improvements have been made to provide a better city. It is the present intention of the authorities to continue this program as long as the need for such work exists and until funds for its execution are unattainable.

German Government to Finance 20,000 Small Homes

Work is to start immediately in Germany on the construction of 20,000 government-financed suburban houses, according to a report made public by the Department of Commerce. The German government financed the construction of some 22,000 similar houses in 1932. According to the report, the 20,000 houses will cost about 50,000,000 R.M., or $11,910,000.

Suburban settlements for industrial workers have been promoted by large industrial concerns for the past 30 or 40 years, but the government's major activity in this respect dates from the fall of 1931. The government has gone into the matter largely from the standpoint of unemployment relief. Unemployed and part-time workers are provided with small houses and plots of ground on favorable terms.

How the Highway Pays—I

Liquidation of Road Costs by Taxes

Methods for studying the relation between highway service costs and earning power as expressed by tax returns

By R. W. Crum

Director Highway Research Board, National Research Council, Washington, D. C.

ECONOMIC CONDITIONS such as now prevail inevitably cause searching inquiry into the justification for all public expenditures. Since highway development has been responsible for huge outlays, it is pertinent to inquire if the existing investment is profitable and if continued development is economically justifiable. The inquiry can be simplified if we conceive of the principal highway systems as public utilities and evaluate them from that viewpoint.

How the highway pays is discussed, on this assumption, in this and the two articles that will follow, by R. W. Crum, Director of the Highway Research Board, National Research Council, Washington, D. C. These articles will cover liquidation of road costs, vehicle-operating economies and analysis of earning power. —EDITOR.

AS IT IS with any public utility, a highway project to be economically sound should have an earning power great enough to cover operating expenses, provide for the necessary betterments and renewals and liquidate the capital investment within a reasonable time. Earnings in the case of highways are of two kinds: (1) returns from taxes imposed upon the road users, and (2) benefits derived from improvements, which accrue to the road users. This article is an exposition of methods for studying the relation between highway service costs and earning power as expressed by tax returns.

The thing to keep in mind is that, although the country has a large capital investment in highways and a heavy annual operating cost, it also can and does collect an income directly from the users of the roads, and that the income should balance the operating and overhead costs.

This discussion applies to those roads which have been called by Thomas H. MacDonald, chief, U. S. Bureau of Public Roads, "general-use roads" in contradistinction to the great mileage of local roads. The line of demarcation is necessarily indistinct and constantly shifting as traffic increases or adopts new routes; but for the present purpose these classes may be divided on the basis of state trunk systems and local roads. The former, which include the federal-aid highway system, the United States numbered highways and other state roads, comprise about 324,500 miles; the latter, about 2,684,500 miles. If sufficient money is collected each year directly from the users of a highway system to pay the actual annual cost of that system for an indefinite time in the future, then that system can be considered to be self-sustaining and projects for its improvement are economically sound. The funds so collected, no matter by what agency or in what way, should be dedicated to the upkeep of those roads.

Annual highway cost

The committee on transportation economics of the Highway Research Board has demonstrated that the annual cost is equal to the interest on the investment plus the annual charges for administration and ordinary maintenance, plus an annual deposit at compound interest to provide money in a term of years for more extensive repairs called periodic maintenance, or betterments and renewals, plus an annual deposit at compound interest sufficient to provide money for rebuilding when the road becomes inadequate to carry its traffic. The amount resulting from the summation of these items is the net annual cost of keeping the road in a standard serviceable condition.

As long as the road is kept up and used as a highway the capital investment is intact, except for losses incident to reconstruction or abandonment by relocation; but whenever the road ceases to be used for transportation it becomes worthless and the entire capital investment is lost. It would therefore be expedient to include in the annual charges against the users an item to liquidate the cost in a reasonable period of years so that the ultimate loss of the capital would not be shifted from the shoulders of the road users to those of the taxpaying public in general. This procedure would undoubtedly be sound in the case of any individual section of road because changing conditions may cause the elimination or relocation of any highway, but it is hardly conceivable that the entire mileage of a state highway system will ever be abandoned. Theoretically therefore there would be no need for liquidating the entire capital investment in a state system, but practically it would no doubt be sound financing to do so.

On the other hand, good arguments can be adduced in favor of not attempting to liquidate the capital investment, the principal one being the fact that over and beyond the interest of the traveler in the roads is a general community interest. Possibly a good practical procedure would be to liquidate through user charges that part of the original expenditure that was made from borrowed money.

It does not make any difference where the capital comes from originally to build the road; the net annual cost of keeping the road in serviceable condition after it is built is the amount shown by the theoretical statement. It is therefore a definite and logical starting point for determination of equitable rates to apply to road use.

Analysis for individual roads

Application of the theory of annual road cost to a particular section of highway is definite and easily made. The committee on highway transportation economies of the Highway Research Boards computed the annual costs for four highways, as shown in Table I. (See *Proceedings*, Highway Research Board. Reports of committee on highway transportation economics, T. R. Agg, tenth meeting; C. B. Breed, twelfth meeting.) One of these was a 6.55-mile section of the Boston Post Road, in Connecticut. The total investment remaining in that road at the date when the analysis was made was estimated to be $837,960, made up as follows:

Right-of-way and property damage	$ 33,335
Drainage structures	85,870
Earthwork	159,500
Salvage value of prior surfaces	84,000
Road surface	435,700
Signs and appurtenances	6,800
Engineering and administration	32,755
Total	$837,960
The ordinary annual cost of maintaining this road is	$ 5,898
The continuing cost of engineering and administration per year is	$ 324

On this particular road it was estimated that the periodic maintenance will consist in resurfacing at a cost of $201,344 every ten years. It was also estimated that at intervals of twenty years further extensive reconstruction of the base will be necessary to the extent of $160.000. The annual cost of the road was calculated as follows:

Interest on $837,960 at 4%	$33,518
Annual maintenance cost	5,898
Annual cost of engineering and administration	324
Annual deposit at 4% compound interest, to accumulate $201,344 in ten years	16,770
Annual deposit at 4% compound interest, to accumulate 160,000 in twenty years	5,380
Total annual cost	$61,890
Annual cost per mile	$9,445

Estimated earnings

It was estimated that the annual movement over this road consisted of 675,000 commercial vehicles and 6,075,000 automobiles.

Under present-day methods of highway administration it is not possible to segregate the amount of money paid in by vehicle owners for the use of one particular piece of road. It is possible though to make a close estimate of the amount of that part of the total state collections generated by this amount of traffic, and thus determine whether or not under existing tax rates the road is self-supporting. If the total traffic of the state were known, the ratio of in-

come derived from this road to total income would be the same as the ratio of the road's traffic to total traffic and could be easily computed. It is quite possible by means of traffic surveys to acquire the data needed for such estimates, and an example will be presented later in a discussion of annual costs and income for an entire state highway system.

In this particular instance, in the absence of such information, the committee estimated the income generated by use of this road by means of the following average factors of operating costs:

Items	Cents
Automobiles; cost of gasoline per mile	1.09
Automobiles; license fee per mile	0.14
Trucks; cost of gasoline per mile	1.78
Trucks; license fee per mile	0.50
Tax per gallon on gasoline in Connecticut	2.00

From these average figures it was computed that the automobiles were contributing $15,126.75 per mile for the use of this road and the commercial vehicles $4,576.50, making a total of $19,703.25. As the annual cost of this road was only $9,445, it is evident that the road is considerably more than self-supporting.

It should not be inferred, however, that the tax rates are too high. When it comes to establishing rates to apply to the whole body of vehicle users in a state, it must be remembered that the general-use highways have been integrated into state systems, and financing arrangements must be made for a system as a whole. The large earning power would not be possible unless certain tributary lines were sufficiently developed to bring the traffic to it, so it is only reasonable that the cost of maintaining the general-use feeder roads should be defrayed to some extent from the excess earnings of the heavy-traffic main lines.

Alternative bonding plan

As public financing of highway improvements has not as yet made use of actual sinking funds to provide for future needs as contemplated in the theory of annual costs, it will be interesting to estimate the annual amounts that would be required for this same road by a system of borrowing for capital investment and major expenditures over a 40-year period, amortizing all bond issues in ten or twenty years.

First Ten-Year Period—At the start it would be necessary to borrow $838,000 at 4 per cent to run for twenty years, and at the end of ten years $201,344 for resurfacing to run for ten years. The only other annual costs would be those for maintenance, engineering and administration.

Yearly payment on principal and interest to amortize $838,000 in 20 years at 4% interest	$61,680
Maintenance, etc	6,220
Annual cost	$67,900

Second Ten-Year Period—For the second ten-year period the yearly expenditures will be as follows:

Yearly payment on amortization of $838,000 in 20 years	$61,680
Yearly payment on principal and interest, to retire $201,344 in 10 years at 4%	24,826
Maintenance, etc	6,220
Annual cost	$92,726

Third Ten-Year Period—At the beginning of this period the capital investment will have to be redeemed, but it will then be necessary to spend $201,344 to be paid off in ten years for resurfacing and $160,000 to be paid off in twenty years for reconstruction.

Yearly payment on principal and interest, to amortize $201,344 in 10 years	$24,826
Yearly payment to amortize $160,000 in 20 years	11,780
Maintenance, etc	6,220
Annual cost	$42,826

Fourth Ten-Year Period—At the beginning of this period it will be necessary again to borrow $201,344 for resurfacing and to continue the payments on the $160,000 borrowed for reconstruction. The annual costs will therefore be the same ($42,826) as for the third ten-year period and will continue at this rate as long as the same expenditures for upkeep are required.

Comparison of plans

The average annual cost over the 40 years, according to this method of financing, will be $61,570. If the financing were managed by means of sinking funds, as contemplated by the formula for annual highway costs, the average annual cost would be $61,892 for interest and upkeep.

In order to put the two methods on a par, a further allowance should be made here to provide also for redeeming the capital investment in the 40 years. This will require an annual sinking-fund deposit of $8,816.

The total annual cost therefore would be $70,708, as compared with $61,570 for the other plan. The difference is due to the fact that under the sinking-fund plan at the end of the 40 years there would be $361,344 cash on hand to pay for resurfacing and reconstruction, whereas under the amortization plan this sum would again have to be borrowed at that time. The total costs for the 40 years on a comparable basis would be:

SINKING FUND PLAN	
Total cost, 40 years	$2,828,320
Credit for cash on hand	361,344
Total	$2,466,976
AMORTIZATION PLAN	
Total cost, 40 years	$2,462,800

The principal advantage of financing according to this sinking fund plan, if it could be done, would lie in the more uniform distribution of the load on the road users over a term of years, whereby all would pay at the same rate for the same service. There might also be some advantage in the precollection of funds for replacements, betterments and renewals rather than in the use of credit for that purpose.

Conclusions

In Table I are shown the relative annual highway costs and earnings for all four of the roads analyzed by the committee, including the section of the Boston Post road that has just been cited to illustrate the methods used in the computations. It will be seen that on two of these roads the traffic was large enough to provide earnings at the existing tax rates in excess of the annual costs, and that on two of them the traffic did not produce enough to cover the annual costs.

There are two principal uses for analyses of highway costs on individual sections of roads. One is for the purpose of building up section by section the data for a system of highways, and the other is for use in studying a proposed improvement project so that the type and extent of the improvement will be properly related to earning power and vehicle-operating costs. These analyses make it apparent that if the revenues derived from the general-use system of roads are not greater than the annual costs, then *any* diversion of these funds will certainly be followed by serious deterioration of the roads.

State highway system study

No detailed study of annual costs of a state highway system is available as this is written. Some estimates of needed expenditures on the state highway and probable available income contained in a report on the state government of Mississippi by the Institute for Government Research of the Brookings Institution can be used to illustrate the process of comparing the annual cost of a state highway system with its earning power.

At the time the estimates were made (1931) the state highway system of Mississippi consisted of 327 miles of 18- or 20-ft. pavement, 91 miles of 9-ft. pavement, 3,202 miles of plain gravel surface, 219 miles of earth surface and 5 miles of bridges. It was suggested in the report that the system be improved by permanently grading and bridging the entire mileage and providing for 2,109 miles of 18- or 20-ft. high-type pavement, and 1,731 miles of inter-

TABLE I—COMPARISON OF ANNUAL HIGHWAY COSTS ON FOUR ROADS WITH ANNUAL EARNINGS AT THE EXISTING TAX RATES

State	Length, Miles	Traffic Vehicles Per Year: Passenger Cars	Traffic Vehicles Per Year: Trucks	Annual Costs Per Mile	Annual Earned Revenue Per Mile
Connecticut	6.55	6,075,000	675,000	$9,445	$19,703
Iowa	26.30	1,000,000	slight	2,620	3,000
Massachusetts	7.28	338,000	32,000	2,327	1,288
Massachusetts	2.94	500,000	48,000	2,685	1,920

mediate-type pavement. The cost was estimated at $75,000,000 and the construction period at seven years. In order to get the cost of the total investment in the state road system, which would have to be accounted for in any financing program, another item of $37,000,000 in county bonds outstanding against previous expenditures on this system should be added to the new construction costs. The total investment therefore would be $112,000,000.

To complete the construction program in seven years and take care of the needed maintenance, the following sum of money would be needed:

For maintenance and administration—7 years @ $2,300,000	$16,100,000
For new construction	75,000,000
For interest on old bonds @ 4½%	11,655,000
Total	$102,755,000

To meet these requirements, the available resources could be estimated from data in the report as follows:

Federal aid	$17,600,000
Motor-vehicle license fees	19,610,000
Gasoline tax	29,020,000
Total	$66,230,000

This estimate of the probable motor-vehicle license fees assumes that all of this tax should be devoted to the state highway system, on the theory that this is a "readiness-to-serve" charge upon all vehicles, for the providing of the state system. The estimated amount of gasoline tax shown is 54 per cent of the expected total collections, that being the percentage of the total state traffic using this system of roads.

The total amount estimated would be insufficient by about $42,000,000, which would have to be borrowed as needed. Borrowing this money would add an interest charge during the construction period of $4,995,000 at 4½ per cent to the estimated expenditure of $102,755,000, making a total expenditure of $107,710,000.

To meet this expenditure, federal aid, license fees, gasoline taxes and bonds would provide $108,230,000.

The average annual cost to Mississippi motorists during the seven-year construction period would be $6,947,143. Including the federal aid, the actual average annual cost during this period would be $9,461,571.

After the completion of the program the annual payments to be made would consist of administration and maintenance expense and interest and principal payments upon the $79,000,000 of outstanding debts. The only source of income would be the returns earned by the roads in the form of vehicle-license fees and gasoline taxes. Without changes in rates, these were estimated to be:

License fees per year	$3,021,000
Gasoline tax per year	5,527,000
Total per year	$8,548,000

In arriving at this figure, 70 per cent of the total state income from the gasoline tax was used, as the proportionate amount of traffic on the state highway system would undoubtedly increase greatly with the completion of this large mileage of surfaced roads. The necessary yearly expenditures are estimated to be:

Administration and maintenance	$2,300,000
Annual payment to amortize the $79,000,000 in 25 years at 4½% interest	5,325,000
Total	$7,625,000

If it is assumed that the existing tax rates are just and reasonable, it is apparent that the earning power of this road system is sufficient to construct and maintain it, also to liquidate the indebtedness in a reasonable period with a surplus left on hand for periodic maintenance. If allowed to accumulate in a sinking fund at 3½ per cent, this surplus of $924,000 per year would produce $10,840,000 every ten years for betterments and renewals.

At the end of the 25 years, when the indebtedness has been liquidated, the annual income could be made the basis for a new bond issue for reconstruction to any extent required; but it is not likely that the original investment would have to be duplicated for this purpose.

Extensions could be made to the system whenever the earning power of the additional mileage would justify the capital expenditure necessary.

The actual annual cost of the highway system, after completion, exclusive of retirement of capital investment, may be computed by the Highway Research Board formula as follows:

Interest on $112,000,000 at 4½%	$5,040,000
Administration and maintenance	2,300,000
Annual deposit at 3½% to accumulate $10,838,520 every ten years for periodic maintenance	924,000
Total	$8,264,000

This annual cost, which includes interest on the federal-aid money and on that spent for construction from current funds, is comfortably within the earning power of the system, and therefore the improvement program is economically sound from a theoretical as well as from a practical financing point of view.

Another important factor that has not yet been considered is that of vehicle-operating costs. The relation between vehicle-operating costs and road-surface types will be the subject of an article in next week's issue.

New Grey Street Bridge in Brisbane, Australia

THE NEW Grey Street bridge in Brisbane, Australia, ranks with the large structures of that continent. In length it is second only to the Sydney Harbor Bridge. Technically, it is interesting because of its foundation construction, which encompassed sinking caissons in artificial islands and the use of some suspended cofferdams, and because of its main concrete-arch superstructure that was erected without falsework by virtue of the use of structural-steel reinforcement from which the formwork could be hung.

The bridge crosses the Brisbane River in three 238-ft. reinforced-concrete arch spans. The north approach consists of two 33-ft. spans, and the south approach is a long viaduct consisting of a 92-ft. arch adjacent to the river and sixteen steel girder spans incased in concrete and varying in length from 34 to 52 ft. The bridge with its approaches has a total length of 1,630 ft.

At the site of the bridge the river is about 700 ft. wide, while the maximum depth is 50 ft. The north bank is formed by an outcrop of rock, which is ideal for foundation construction, but the south bank is somewhat lower and consists of alluvial material. The riverbed is composed of silt overlaying the rock, which is found at about 100 ft. below water level. The river is subject to an 8-ft. maximum range of tide.

Foundations

Construction of the piers for the main river crossing occasioned some unusual foundation construction. The two river piers (piers 3 and 4) are each supported on two reinforced-concrete cylinders 28 ft. in diameter, and pier 5 on the south bank is founded on two reinforced-concrete caissons 20x34 ft. in plan. These three foundations were sunk to rock from 83 to 107 ft. below high-tide level. Pier 6, near the south bank, is a thrust pier to the 92-ft. arch adjacent to the main span. Its foundation consists of eight 7-ft.-diameter reinforced-concrete cylinders sunk 85 ft. to rock The piers under the remainder of the spans were founded on piles driven to a nominal depth.

Piers 3, 4 and 5 were built by the artificial-island method, in which sheet-piling inclosures are filled with sand and dredged material. through which the caissons are sunk. (The most notable artificial-island job carried out in the United States was on the Suisun Bay crossing of the Southern Pacific Railroad in California—*ENR*, Jan. 30,

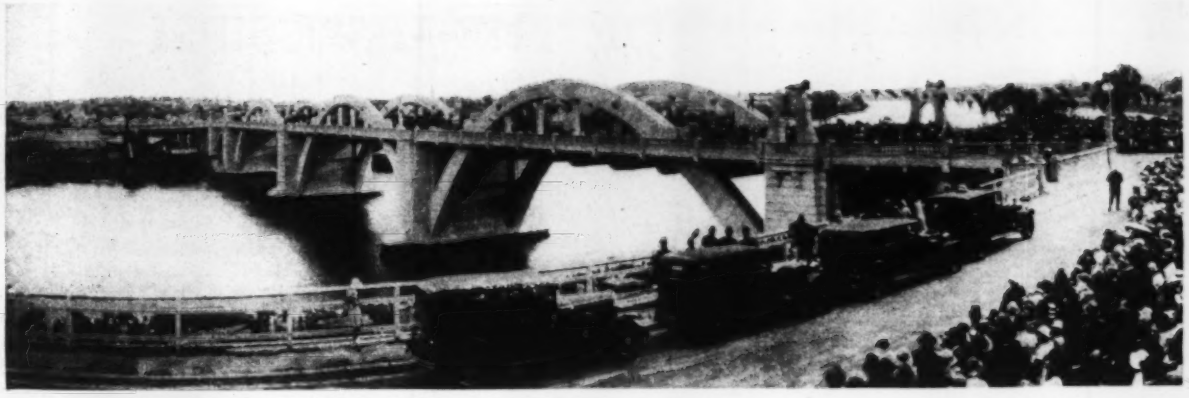


Fig. 1—New bridge at Brisbane, Australia, on the opening day. The river arches are 238-ft. spans and consist of structural-steel ribs incased in concrete. The deck provides a 40-ft. roadway and two 11½-ft. sidewalks.

1930, p. 174). For piers 3 and 4 steel sheetpiling was used, and the inclosures were 29½ ft. in diameter. For pier 4 the piling was 44 ft. long, driven 12 ft. into the gravel of the riverbed and projecting 1 ft. above high-tide level. For pier 3, spliced piles 70 ft. long were used, driven 17 ft. into the sand composing the riverbed. At pier 5 the inclosures were constructed of timber sheetpiling on timber piles. The shape was rectangular, corresponding to the shape of the caissons.

In sinking piers 3 and 4 through the artificial islands the cutting edges were first placed, and the concrete caissons (15-ft. internal diameter and 28-ft. external diameter) were built up in 6-ft. lifts, as the material was removed by clamshell buckets. When the caissons reached a boulder formation, they were fitted for compressed-air work for the last few feet of sinking. A similar method of construction was followed for the rectangular caissons of pier 5.

Air pressures of 35 to 60 lb. per sq.in. were required, and in six months of continuous operation no fatal case of caisson disease occurred, nor was any man permanently disabled. Each man worked two shifts in 24 hours, the duration of the shift in the working chamber being two hours in the case of the shallower foundation at pier 5 and 1½ hours in the case of the deeper foundations at piers 3 and 4. The men were locked in at the rate of 2 lb. per minute, and locking out was conducted according to the following rule: decompression to half the gage pressure at the rate of 2 lb. per minute, then 5 lb. at the rate of 1 lb. per minute, then 5 lb. at the rate of ½ lb. per minute, then to atmospheric pressure at the rate of ⅓ lb. per minute. By this method the length of time occupied in de-compression was considerably lengthened as the working pressures increased.

On the completion of the foundation shafts, each pair was connected at the top by a reinforced-concrete beam faced with granite masonry. These beams are 96 ft. long, 20 ft. wide and 9 ft. 9 in. deep. They extend from a depth of 1 ft. 6 in. below low tide to 3 in. above high tide. In constructing them a watertight box was built around the site with the cylinder heads protruding through its floor. This box was suspended from temporary timber piling, and in it the beams were cast in the dry.

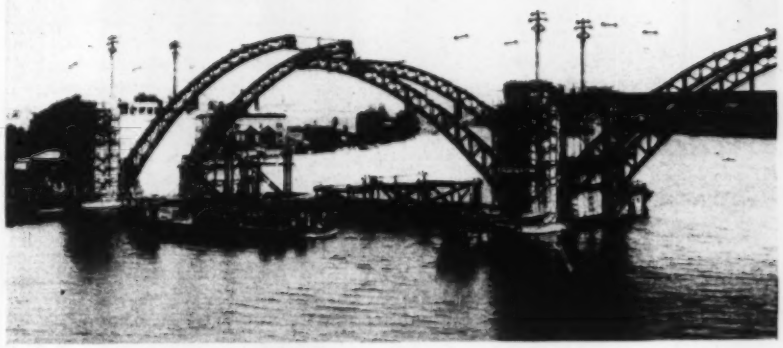


Fig. 2—Erecting the three-hinged structural-steel arches, which later were incased in concrete

The eight cylinders forming the foundations of pier 6 were sunk to rock through 85 ft. of water-bearing mud, sand and gravel. To overcome skin friction, the reinforced-concrete shells were made as heavy as possible by constructing them to maximum thickness. This thickness was limited to 11 in., inasmuch as dredging wells had to be 5 ft. 2 in. in diameter to be large enough to admit an orange-peel bucket. The cylinders were sunk without loading to about one-half their final depth when loading to the extent of 100 to 130 tons each was required.

Superstructure

The principal element of interest in the superstructure resides in the three 238-ft. arches over the river. The north approach to these arches consists of reinforced-concrete girder spans, while the south approach is made up of steel beams incased in concrete resting on concrete piers. The 92-ft. arch on the south approach consists of four reinforced-concrete ribs surmounted by open-spandrel deck construction. The river arches are of reinforced concrete with structural-steel reinforcing. This reinforcing consists of three-hinged arches erected as cantilever arms. The deck consists of a reinforced-concrete slab supported on structural-steel cross-girders and stringers incased in concrete.

The steel arch ribs for the river spans were shipped to the site in 11-ton sections. The first section of each arch was mounted on the hinge pin, and the others were progressively connected and supported on timber staging near the water level. When all sections were in position the two halves were raised to the proper level at the crown by means of overhead cables. During and after erection the arch ribs were guyed from upstream and downstream points located on the axes of the hinge pins, these guys serving as temporary windbracing. The bridge was completed by hanging formwork from the structural-steel arches and incasing them in concrete.

The information in this article has been supplied by A. E. Harding Frew, consulting engineer, Brisbane, who designed the bridge and supervised its construction, and by M. R. Hornibrook, managing director of M. R. Hornibrook, Ltd., the contractor. Information is also taken from a paper by G. O. Boulton, chief engineer for the contractor, which was read before the Australia Institution of Engineers.

NEW PLANS FOR THE MISSISSIPPI

Straightening by Cutoff Channels

Second of a Series of Eight Articles

Hydraulic efficiency of the tortuous channel of the Mississippi is being improved by a series of artificial channels cutting off river loops—Model tests controvert old beliefs as to the danger of cutoffs to channel regimen

LATE IN 1929 the Mississippi River broke through into a sluggish stream partly crossing Yucatan Point, about 40 river miles below Vicksburg, and cut off about 10 miles of a channel loop. This cutoff was permitted to occur, and it was the first time since 1884 that such natural straightening action of the river had not been resisted by strong defenses of spur levees or bank revetment. A new attitude of mind toward river shortening had come into being, and this has rapidly developed into a policy of action.

Three years after the Yucatan breakthrough, the river engineers had put dredges to work on a designed cutoff at Diamond Point, a few miles above Yucatan Point. This constructed cutoff and two others (excavated later at points lower down the river) are now open to flow. With them a program of river straightening exceeding all precedent and approaching all but extravagant previous speculation has been inaugurated on the Mississippi.

Cutoff tradition

To appreciate this new development in its full significance a background of river history as it relates to natural channel shortening is necessary. As illustrated in a previous article (*ENR*, June 22, 1933, p. 795) the river has from past ages woven its sinuosities back and forth laterally across a wide valley. This movement, in a century of systematic levee control, has gradually narrowed, but always it has gone on, eradicating loops and forming others, to be in turn abandoned. The changes are slow, and the creation of cutoffs and the formation of new loops are counted in decades of time. No violent or spectacular hydraulic phenomena characterize cutoff creation. Indeed the slowness of action is responsible for much of the mystery and tradition that has surrounded cutoff phenomena. So slow has action been that only prolonged and accurate observation could make possible a complete estimate of effects. A half-century policy of preventing cutoffs has naturally eliminated all opportunity for such observation.

The Yucatan cutoff provided an example for observation. No cataclysm of river regimen resulted. This encouraged the idea that none should be expected to result. Indeed cutoff history for 150 years has pointed the same way. The facts that tipped the balance of belief were, however, the findings of model tests at the Waterways Experiment Station at Vicksburg. Obviously the doctrine of channel straightening would have been developed into a policy of action without the laboratory experiments, for the conditions were set for such a result, but the model tests added confidence and direction to the new thinking.

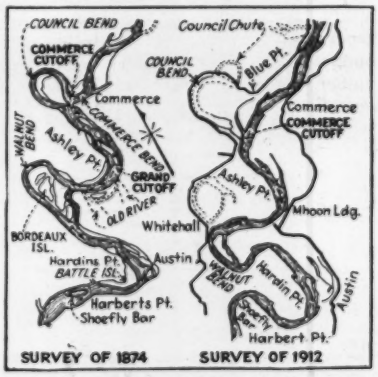


Fig. 1—Commerce cutoff, about 40 miles below Memphis. Course of river in 1874 just before the break-through and as it had developed by 1912.

The breaking of a 50-year tradition that cutoffs were phenomena to be shunned naturally raises the question as to how such a tradition grew up. Records of main river cutoffs since 1722 are given in the accompanying table, from the files of the Mississippi River Commission. This record does not include such changes of channel as have come about from the reopening of old channels from which the main flow had previously shifted or the enlargement of a minor into main channel. The record is only that of true cutoffs.

The main observation from all of these loop eliminations was that the river channel, which between 1765 and 1929 had been shortened 228 miles by cutoffs, was still nearly as long in 1929 as it was 150 years earlier. Compensating lengthening had taken place to offset the temporary shortenings resulting from cutoffs. It was reasoned that as a cutoff merely meant channel changes above and below that restored the original mileage, possibly accompanied by dangerous bank caving and objectionable bar formation, such shortenings were to be discouraged.

Support had been given to this conclusion by experience at a number of cutoffs, although in as many or more instances no radical channel changes had been recorded. For illustration, the Centennial and Commerce cutoffs were followed by disastrous and far-reaching results, while the Palmyra, Waterproof and Yucatan cutoffs were not followed by sudden or violent channel changes. As an example of radical channel alteration, the cutoff in 1874 at Commerce, 40 miles below Memphis, is particularly striking. The channel at this point as of 1874 and 1912 is indicated by Fig. 1. The first cutoff, at Commerce proper, occurred at high water and was fully developed in a few days. It shortened the channel about 10 miles. Ashley Point soon began to erode, and the current was thrown into the bend below. Bordeaux chute began to widen and formed another cutoff, which shortened the channel another 6 miles. Erosion and bar formation followed, and the channel took on new sinuosities that restored nearly the original mileage.

Commerce cutoff is an example of the feared channel changes that led to the belief that such shortenings were occurrences to be prevented. Cutoffs not followed by violent channel changes, as at Palmyra and Waterproof, were explained by the fact that in the reaches below Vicksburg the banks and bed were of more stable materials and currents more gentle than in the Memphis-Greenville reaches. From this explanation developed the still current opinion that while cutoff possibilities may be considered between Vicksburg and Natchez, they should not be contemplated in the reaches above and below Memphis.

Another belief that has contributed to cutoff tradition is that such shortenings resulted in a radical change in stages or

water levels both above and below the cutoff. The report of Charles Ellet in the early '50's and that of Capt. A. A. Humphreys and Lieut. Henry L. Abbot, Corps of Engineers, in 1861, have been the basis for this belief. Both agreed that cutoffs lower the stages above and raise them below; Humphreys and Abbot in fact gave formulas for determining the theoretical stages. Regarded almost as scriptural truths, the monumental Mississippi River studies of these three engineers for 75 years colored official thinking on the effects of cutoffs on river stages. Positive change of thought began only with the determinations by the Waterways Experiment Station from model studies in 1930 of cutoffs at the Greenville Bends (*ENR*, July 16, 1931, p. 84). These rank as the most authoritative information on Mississippi cutoffs now available.

Before considering the laboratory studies it is well to reorient the previous beliefs described with the factual evidence that existed. First, in 165 years twenty cutoffs had occurred, shortening the channel 228 miles, and the river had regained virtually all of this lost mileage by creating new sinuosities of channel. Second, of the cutoffs of which there was true record, those in the upper delta had been followed by violent channel changes, and those in the lower delta had not caused any sudden channel adjustment. Third, computations by Ellet and by Humphreys and Abbot indicated that cutoffs lowered stages above and raised stages below the shortening.

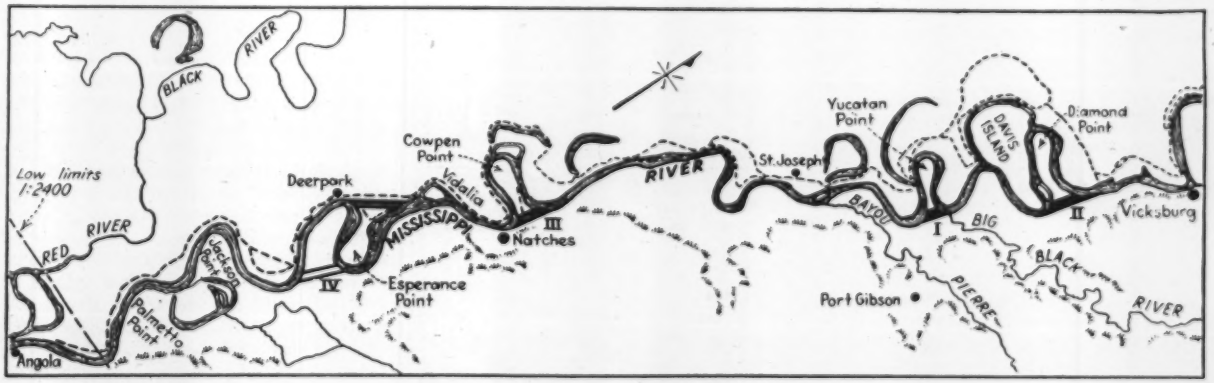
LIST OF CUTOFFS ON MISSISSIPPI RIVER BELOW CAIRO

	Miles Below Cairo	Bank Through Which Cut Was Made	Year in Which Cutoff Occurred	Reduction in River Length Caused by Cutoff Miles
Needham's	135	West	1821	11
Centennial or Devil's Elbow	204	East	1876	15
Commerce	270	East	1874	10
Bordeaux Chute	279	East	1874	7
Montezuma	314	West	Between 1796 and 1817	11
Horse Shoe	320	West	1848	9
Napoleon or Beulah Lake	400	West	1863	10
American	497	West	1858	11
Grand Lake	517	East	Between 1796 and 1817	10
Bunchs Bend	524	East	1830	12
Terrapin Neck	576	West	1866	16
Yazoo	596	West	1799	12
Centennial Lake	601	West	1876	6
Davis or Palmyra	623	East	1867	19
Yucatan Bend	638	East	1929	10
Waterproof	680	West	1884	12
Homochitto	753	West	1776	13
Shreves	771	East	1831	15
Raccourci	775	East	1848	19
Fausse River	814	East	1722	21

Experimental studies

Following the break-through of the river at Yucatan point late in 1929, a comprehensive series of model studies of cutoffs was begun at the Waterways Experiment Station. These tests were conducted on several orders from November, 1930, to December, 1931, and were therefore in several parts. Substantially in sequence, the experiments were: (1) effects of various cutoffs in the Greenville Bends; (2) cutoffs at Tarpley Neck in the Greenville Bends; (3) study of ten dredged cutoffs from above Arkansas City to below Natchez; and (4) cutoff at Diamond Point. These tests were conducted with two models, one with length scale of 1:4800 and height scale of 1:360, and the other with length scale of 1:2400 and height scale of 1:120. The latter was built in the open to reproduce in miniature the river from Rosedale to Baton Rouge and all topography from the Mississippi hills on the east to Macon Ridge on the west.

The larger model is the largest river model ever built. It includes 500 miles of river, as at present extended, and occupies a ground area 500 ft. long and 120 ft. wide. These dimensions are the sum



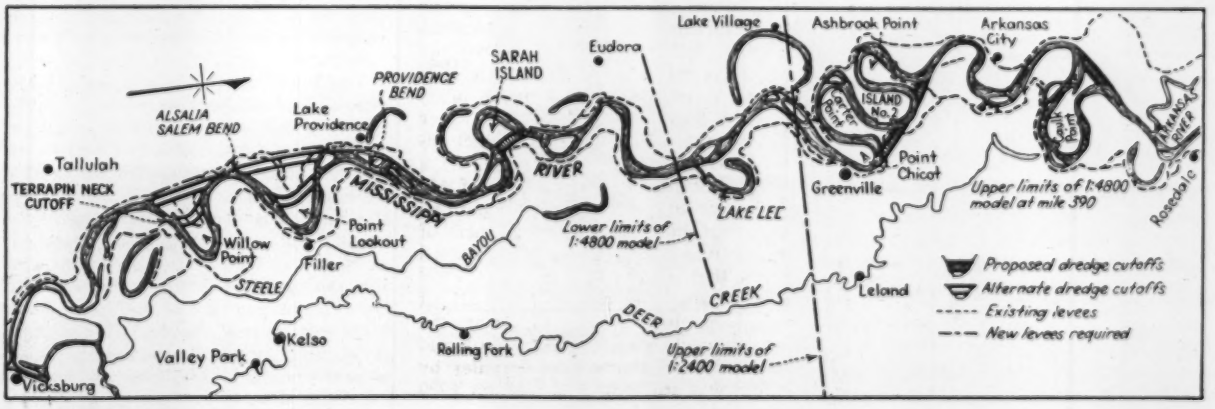


Fig. 2—Mississippi River from above Greenville Bends to below Natchez, part of the stretch included in the test models, showing ten proposed cutoffs that were tested and the four cutoffs included in the present construction program.

of several additions made from time to time as requirements for new experiments developed. Model construction and operation followed regular laboratory practice as described in a succeeding article. Only results and conclusions are presented at this time.

The outstanding hydraulic determination of the series of cutoff experiments was developed in the small model tests of Greenville Bends cutoffs. Briefly, it was that a cutoff results in: *(1) a general lowering of the flow line above the cutoff; and (2) no change in the elevation of the flow line below the cutoff.* This was a positive contradiction of the previously held theory of Humphreys and Abbot.

Summarized, the model tests indicated lowering of up-river stages, which are greatest just above the cutoff and gradually decrease to zero at an upstream point determined by channel regimen, but range from 50 to as far as 100 miles above. Below the cutoff there was a temporary elevation of stage until the reservoir effect of the upstream areas had disappeared. With a channel stricture below, a temporary increase of stage might continue until the stricture is reduced by erosion. So also detritus removed from the cut might temporarily choke the channel and increase stages. In general, these temporary downstream-stage effects reached only a mile or two below the cut.

Confidence in thinking given by these first determinations of the hydraulic phenomena of cutoffs led to a model study of a program of ten cutoffs from Greenville Bends to below Natchez, as shown by Fig. 2. The motivating object of this experiment was to find means of eliminating overflow through the Boeuf floodway. It was therefore planned to determine: (1) capacity of river channel; (2) river levels for a 1927 flood; and (3) low-water levels—all for a river first without and then with the proposed cutoffs. The test models were those previously referred to; their limits and horizontal scales are indicated by Fig. 2. Incidentally it may properly be noted that this is the most elaborate experimental study of river cutoffs ever conducted. As it applies to the outstanding current problem of Mississippi River improvement, the observed phenomena and summary of results deserve special attention.

Briefly, the model study of the ten cutoffs led generally to the conclusion that a lowering of stages will result immediately upstream, while immediately below (except as lowered by the next cutoff downstream) the same stages will be preserved as before. To provide for increased discharge, therefore, a considerable increase in levee heights would be necessary downstream before any advantage could be taken of the additional capacity that the cutoffs would give in the short stretch of river affected by them.

Experiments with sedimentary materials in the model, to determine the effects of erosion and deposition, showed that little or no permanent effect on stages will be noted as a result of bars building below the individual cutoffs. In the case of practically every cutoff across a narrow neck, an elongated bar was built up below the downstream mouth of the cut during high stages.

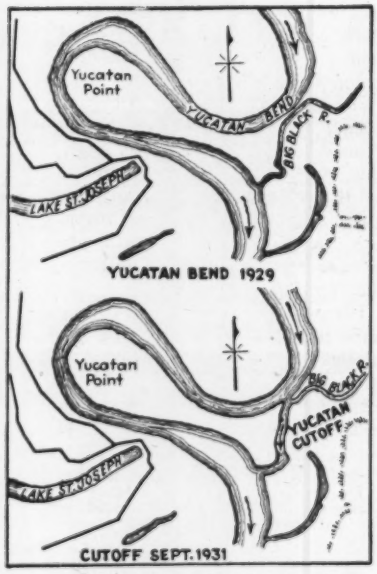


Fig. 3—Yucatan cutoff just before the break-through and after two years of progress; this cutoff now carries about three-quarters of the flow and the head of the old loop in silting up.

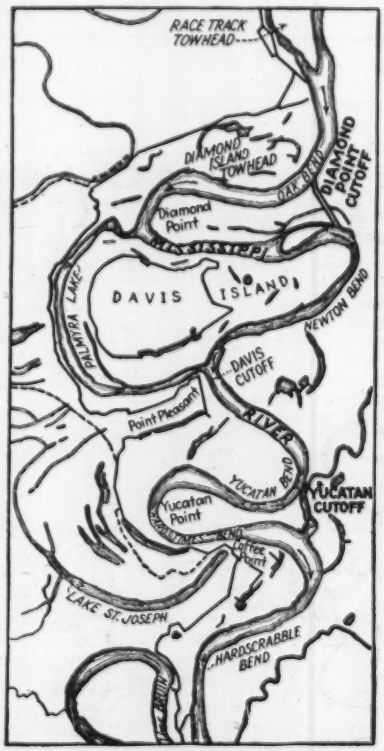


Fig. 4—River reach straightened by cutoffs at Yucatan and Diamond Point; Diamond Point is a constructed cutoff formed by a dredged pilot channel now being enlarged by scour.

This sometimes tended to flatten the water surface within the cutoff and thus produce a temporarily steep slope below, but in every instance it was only temporary; the bar later was moved aside during falling stages and with low-water flow. In every case sedimentation occurred rapidly within and at each end of the channel that had been abandoned.

Specifically, a project channel capacity of 2,000,000 sec.-ft. at Arkansas City gage, at project stage of 62.5 ft., can be increased to 2,404,000 sec.-ft. by the cutoffs proposed. The increased discharge would require raising the project levees by 3 to 6½ ft.

Briefly, the net result of the laboratory study of cutoffs was: (1) disproof of the theory that lowering of stages above the cut is accompanied by a permanent rise in the downstream stages; and (2) proof that flood capacity cannot be appreciably increased beyond zones of cutoff influence without increased channel capacity by levee raising or channel deepening in these outside zones.

Construction program

As stated in the previous article, based on these laboratory studies and on general reasoning, a program of river straightening by cutoffs and a reduction of slope irregularities is now in progress. This program may reasonably be dated from the Yucatan cutoff. While this cutoff cannot be said to have been planned, it was anticipated and permitted and so assumed an essential place in the program. To even greater purpose, it has provided an example for the observation of cutoff action. These studies, although the cutoff is not fully developed, provide useful information.

The Yucatan cutoff, just below the break-through and as developed not quite two years later, is shown by Fig. 3. It is interesting to note, as a sidelight on cutoff tradition as just discussed, that, anticipating imminent break-through, the commission placed a mattress in the channel of the Big Black River below the point of the impending breach, with the idea of limiting the rate of cutoff channel enlargement. When the river broke through, this mattress was soon flanked and put out of commission, and nothing untoward occurred.

The cutoff developed gradually, without violent change in river regimen above or below the cut. By the end of 1931 (two years) about 40 per cent of the river discharge was passing through the cut. Virtually all this time the cut had been under low-water flow. In January-April, 1932, a moderate rise of the river hastened enlargement, and by the middle of April the cut was carrying 60 per cent of the flow. Since then enlargement has been progressive. The effect of the shortening on slopes appears relatively small, hardly possible to distinguish from that of the minor

channel changes constantly taking place. Comparison of water profiles shows a material stage depression upstream and a slight stage increase immediately downstream due to temporary deterioration of the channel below the cutoff. The upstream end of the old loop is silting up. During the period of rapid erosion the scoured-out detritus was deposited in the main channel below and a slight increase in stage resulted. A mile or two farther downstream no change in the normal water-surface profile can be observed. These phenomena are enumerated as indicating that Yucatan cutoff development is proceeding normally.

Considering Yucatan as a planned cutoff and as having improved the getaway for the water from above, a cutoff was projected at Diamond Point as the succeeding step in straightening this particularly sinuous reach (Fig. 4). Test runs at the Vicksburg hydraulic laboratory on a model of the Diamond Point cutoff showed results which warranted the conclusion that "The proposed cutoff at Diamond Point appears to be entirely free from any serious objection. Its principal direct advantage is the lowering effect indicated for the extensive Yazoo backwater area. All usual criticisms are lacking; it does not endanger any existing levees, but on the other hand diverts the waters from Palmyra Lake, where the present levees may be threatened; it does not endanger any improved lands; nor does it accelerate the flow in a manner detrimental to navigation. From the latter standpoint, on the contrary, it should result in a material aid to river commerce by shortening the distance 12 miles, eliminating the existing branching and providing depths uniform with the remainder of the river."

On this indication a dredge cut was made, 300 ft. wide and 30 ft. deep, working from both sides of Diamond Point to a common point between, where a narrow dike of earth was left to be blasted out after withdrawing the dredges. The final cut was blasted Jan. 8, 1933. The dredging was a simple operation, using conventional equipment, and the dredge cut was merely a pilot channel to be enlarged into full channel capacity by the scour of the diverted water. This enlargement is now in progress, having proceeded as shown by Fig. 5.

Since the latest profile (Fig. 5) the erosion has increased and the channel is now about 800 ft. wide. On May 30th it was carrying about 366,000 sec.-ft., or about a third of the river flow. About all the river traffic now uses the cutoff, and it will probably be the low-water navigation route this summer.

The materials of the cut-through require notice in observing the progress profiles: A thick bed of clay overlay sand. The resistance of the clay to surface erosion is to be noted in connection with the laboratory erosion studies summarized in a succeeding article. Successful deepening has occurred only through a process of scouring out the sand to undermine and break down the clay.

The two remaining cutoffs in the immediate construction program are located at Cowpen Point or Giles Bend, just north of Natchez, and at Glasscock Point, about 20 miles downstream from that city. This river reach with the cutoffs as located is shown by Fig. 6.

Both of these cuts have now been dredged through. The work at Glasscock proceeded in normal fashion, but at Giles Bend the river took matters into its own hands before the channel cutting was completed. Work on this cutoff was begun by two dragline machines on March 24. The dredge "Catt" started at the lower end on April 6, deepening the cut made by the dragline. On May 25 the "Catt" had dug a channel averaging about 35 ft. in depth and 170 ft. in bottom width to within about 2,500 ft. of the upper end of the cutoff. This 2,500 ft. had ben dug by the draglines to a depth of about 17 ft. and a bottom width of about 175 ft.

It had been intended that the "Catt" dig for about two more days in order to get through a clay ridge she was cutting on, but the thin dam or plug left at the upper end of the cut broke on the morning of the 25th. The profile (Fig. 7) shows the dredging that was done and the scour that has taken place.

The series of four cutoffs is indicated by Roman numerals on Fig. 2. Except at Yucatan they are all too undeveloped to indicate what results may follow in changes of channel; it is not anticipated by the river engineers that these will be violent.

Fig. 5—Profiles, showing progress of enlargement by scour, of the cutoff across Diamond Point.

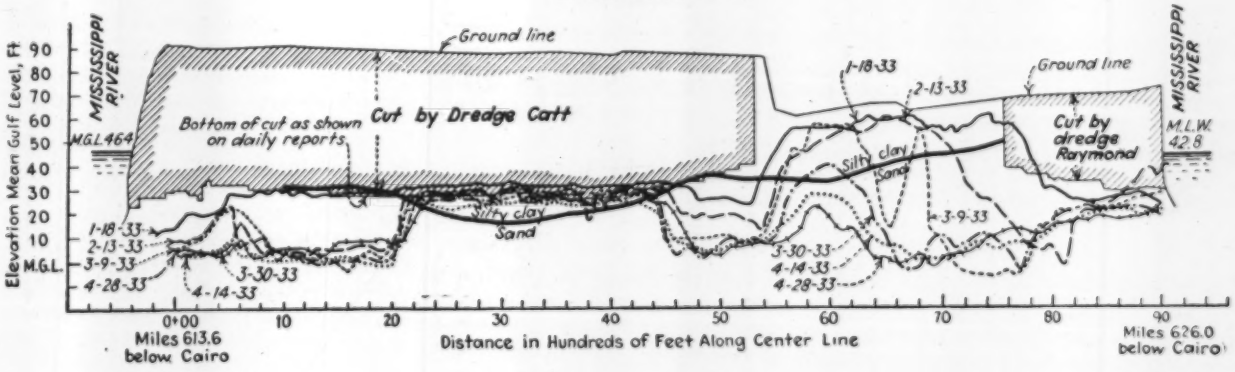


Fig. 6—River reach straightened by cutoffs at Giles Bend or Cowpen Point, and at Glasscock Point in the vicinity of Natchez. These are the second and third of the constructed cutoffs in the present program.

Objectives sought

As developed in the general discussion which introduced this series of articles (*ENR*, June 22, 1933, p. 795), the present cutoff program is a fractional part, highly important both because of the physical task and because of its radical overturning of precedent, but none the less a part only of the main undertaking to make the river a more efficient hydraulic conduit. Many

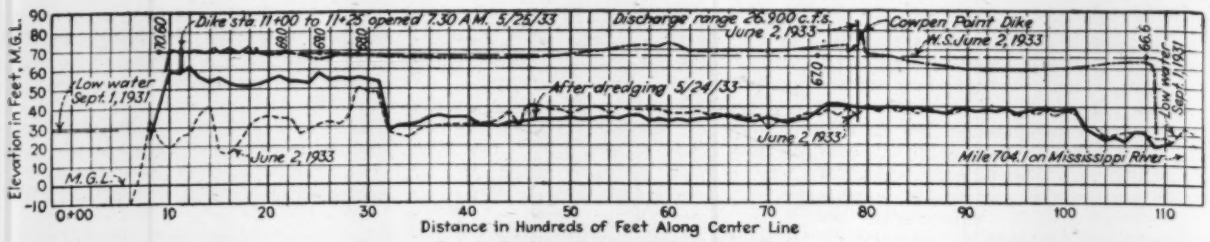

Elevation in Feet, M.G.L.
Dike sta 11+00 to 11+25 opened 7.30 A.M. 5/25/33
Discharge range 26,900 c.f.s. June 2, 1933
Compen. Point Dike W.S. June 2, 1933
Low water Sept. 1, 1931
After dredging 5/24/33
June 2, 1933
June 2, 1933
Mile 704.1 on Mississippi River
Low water Sept. 1, 1931
M.G.L.
Distance in Hundreds of Feet Along Center Line

Fig. 7—Profiles showing dredge cut and scour as of June 3 at the cutoff at Giles Bend.

other fractions, as previously noted, are required to make up the whole undertaking. The cutoff program is tied up particularly, however, with the problem of slope improvement. In essence, cutoffs as planned are elements in a magnificent undertaking to revise the slopes of the river from Vicksburg down to the now deep and comparatively stable channel south from Baton Rouge. They have an engineering significance that extends to very broad horizons of Mississippi River regulation and flood control.

Extension of the cutoff program to the river reaches above Vicksburg and to the particularly tortuous Greenville Bends reach is undetermined at present. In fact, the present attitude is opposition, especially as to the series of loops above Greenville. This section of the river offers difficulties in greater instability of bed material and in velocity of current than exist south of Vicksburg. For the moment, at least, the present program of cutoffs stands by itself.

Continuous Beam Design by the Fixed Point Theory

Graphical method permits easy construction of moment diagrams for any sequence of span lengths or any condition of loading

By Odd Albert
East Orange, N. J.

SEVERAL graphical methods for designing continuous beams have been developed. In these methods either the "characteristic points," as developed by Fiddler, or the "fixed points," as developed by Culmann, have been utilized to a greater or less degree. It is the belief of the author that the Culmann method, as published by Prof. Dr. W. Ritter in "Anwendungen der Graphischen Statik" (four volumes, 1888-1906), is more suitable for a variety of conditions and is also more easy to use.

The design of a continuous beam depends upon the combined effect of the loading and of the lengths and moments of inertia of the several spans. Culmann succeeded in separating these effects, thereby making each effect statically determinate. The effect of the relation of the spans to each other is expressed by the "fixed points," which can be determined for a continuous beam, in complete disregard of the loading. The effect of the loading, on the other hand, is expressed by the "cross lines," which can be constructed as functions of the loaded span considered as a single beam freely supported.

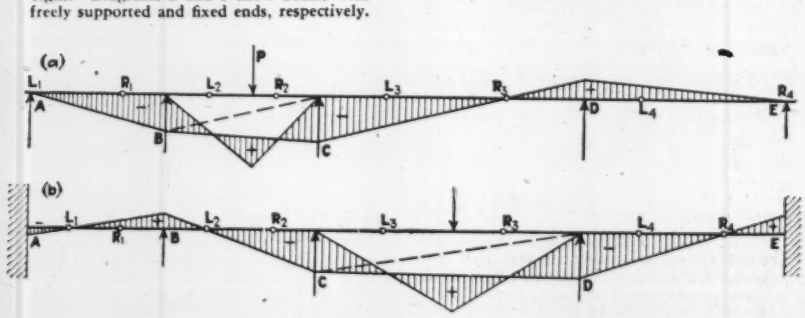
This method of design as presented more than 50 years ago, but never as widely used as it deserves, is given below with a few modifications that have been made in order to make it more adaptable for modern design needs.

The theory may be expressed briefly as follows:

The elastic line of the continuous beam is drawn to go through the supports, using the simple moment areas as loads. In the second span of Fig. 1a the true moment area *equals* the simple moment area reduced by two triangle areas, $F_2 = \frac{1}{2}M_B l_2$ and $F_3 = \frac{1}{2}M_C l_2$. Hence the loads representing the triangles must lie in the third-point lines, as the center of gravity of a triangle is one-third of its height up from the base.

The triangles $F_1 = \frac{1}{2}M_B l_1$ and $F_2 = \frac{1}{2}M_B l_2$ have the same base M_B, therefore the areas must be in the same relation to each other as the spans are. The center of gravity of the two loads F_1 and F_2 will therefore lie on a line that will divide the distance between F_1 and F_2 in the reversed ratio of the adjacent spans. This line is called the reversed third-point line.

Fig. 1—Right and left fixed points in spans of a continuous beam. Moments at right fixed points are zero for loading on spans to left; and moments at left fixed points are zero for loading on spans to right. Diagrams *a* and *b* show beams with freely supported and fixed ends, respectively.



Definition of fixed points

In each span of a continuous beam there are two fixed points, *L* and *R*. The moment at an *R*-point is always zero for any loading on spans to the left. (See R_1 in Fig. 1a and R_4 in Fig. 1b.) Likewise the moment at an *L*-point is always zero for any loading on spans to the right. (L_1 and L_3 in Fig. 1b.)

If the end spans are freely supported, the first *L*-point coincides with the left end support, and the last *R*-point coincides with the right end support (L_1 and R_4 in Fig. 1a). If, on the other hand, the end spans are fixed, then the distance from the end supports to the first *L*-point and the last *R*-point is equal to one-third of the span (L_1 and R_4 in Fig. 1b). For partly restrained spans these distances are less than one-third the span length.

Construction of fixed points

The graphical method of locating the fixed points is indicated in Fig. 2. First draw in each span the third-point lines (dotted) and the reversed third-point lines (point-dotted). Then draw from the end support *A* a line *AB'* in any di-

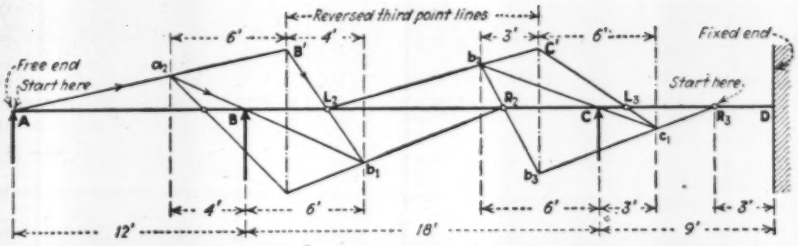


Fig. 2—Graphical construction to locate fixed points for both free and fixed end beams.

rection to the first reversed third-point line. Draw a_2 B to b_2 on the second-span third-point line. Then $B'b_2$ locates the fixed point at L_2. The line L_2C' drawn in any direction gives b_2 on the last third-point line in this span with C' on the next reversed third-point line. Then b_2C locates c_1 on the third-span third-point line, and connecting the points C' c_1 locates the next fixed point L_3. Going from left to right in this manner all the L-points are located for a continuous beam with any number of spans.

The fixed R-points are found by starting from the right end, and proceeding in the same manner toward the left. As the right end of the beam in Fig. 2 is assumed to be fully restrained, it is necessary to start at the outside third-point R_3. However, a short-cut method is shown in Fig. 2, where R_3 c_1 locates b_2, and then b_3 b_2 locates R_2, etc.

Attention is called to one characteristic of this construction—namely, that a series of trapezoids is formed by the construction lines, with the tops and

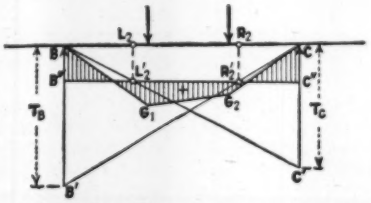


Fig. 3—Graphical construction of cross-lines, whose intersection with verticals through the fixed points locates the closing line for the moment diagram.

bottoms on the reversed third-point lines and one of the diagonals going through the support.

If the moment of inertia for a span is constant but changes from span to span, the reversed third-point line moves toward the span with the smaller moment of inertia. If (I_1) and (I_2) are the moments of inertia for the spans l_1 and l_2, respectively, then the reversed third-point line may be located by dividing the distance between adjacent third-point lines in the ratio $l_1 I_2$ to $l_2 I_1$.

The "cross-lines"

With the use of the fixed points and the so-called "cross-lines," the moment diagram for a given span may be constructed with a complete disregard of adjoining spans. In Fig. 3, span BC of Fig. 1a is shown with the fixed points L_2 and R_2 known and with two concentrated loads applied. Draw the moment diagram BG_1G_2C for the beam BC considered freely supported. Figure this moment area and determine its center of gravity. The area times the distance from the center of gravity to B gives the static moment with reference to support B. Plot this value (T_B) divided by $l^2/6$ from B down to B'. In the same way point C' is found. Connecting B with C' and C with B' gives the cross-lines. The cross-lines intersect the verticals through the fixed points in L'_2 and R'_2. The line through these points is the closing line for the moment area, giving the value of M_B as BB'' and of M_C as CC''.

Uniformly distributed load

It is simple to determine the moment area for a uniformly distributed load. For a freely supported beam (BC in Fig. 4b) the moment area is a parabola.

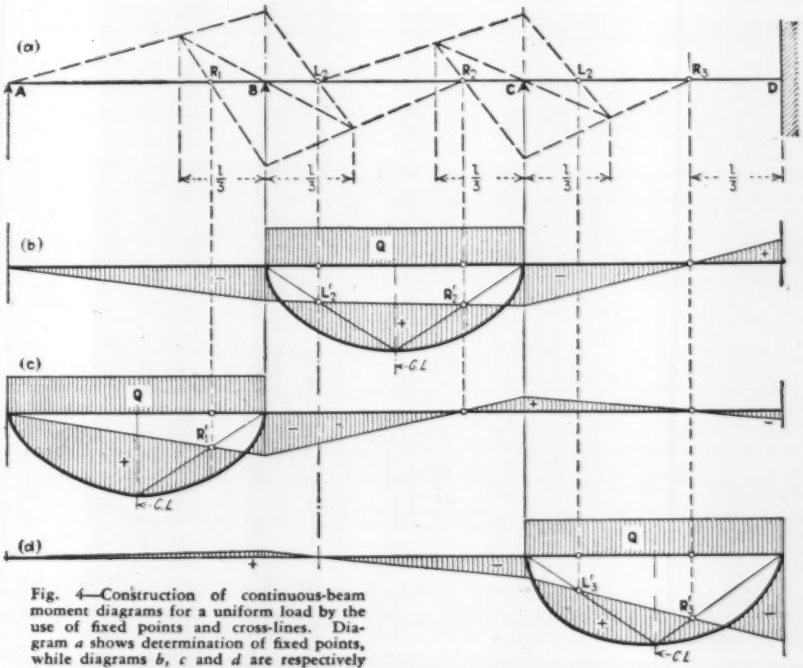


Fig. 4—Construction of continuous-beam moment diagrams for a uniform load by the use of fixed points and cross-lines. Diagram *a* shows determination of fixed points, while diagrams *b*, *c* and *d* are respectively for loads on a center span, on a freely supported outside span and on a fixed-outside span.

Since, in Fig. 4, all three spans are alike, the reversed third-point verticals go through the supports. The area of the parabola is

$$F = \frac{Q\,l^2}{12}$$

and the static moment is

$$S = \frac{Q\,l^2}{12} \times \frac{l}{2} = \frac{Q\,l^3}{24}$$

which, divided by $l^2/6$ gives $Ql/4$. This distance is equal to twice the moment $Ql/8$. Hence the cross-lines meet at the vertex of the parabola. The construction is shown in Fig. 4b. For an outside span freely supported the construction is shown in Fig. 4c, while Fig. 4d shows the construction for an outside span with fixed end.

Should several spans be loaded at the same time, it is advisable to treat one span at a time and afterwards summarize the results.

Concentrated load in one span

If a concentrated load is applied in the middle span of a continuous beam, as shown in Fig. 5b, the simple beam moment area is $B_1C_1S_2$. Assuming that the ordinate at S_2 is m, the area of the triangle is $F = \frac{l_2 m}{2}$, and its center of gravity is found to be $\frac{l_2 + x}{3}$ from the support B. Therefore, the static moment about B is

$$S_B = \frac{l_2\, m\, (l_2 + x)}{6}$$

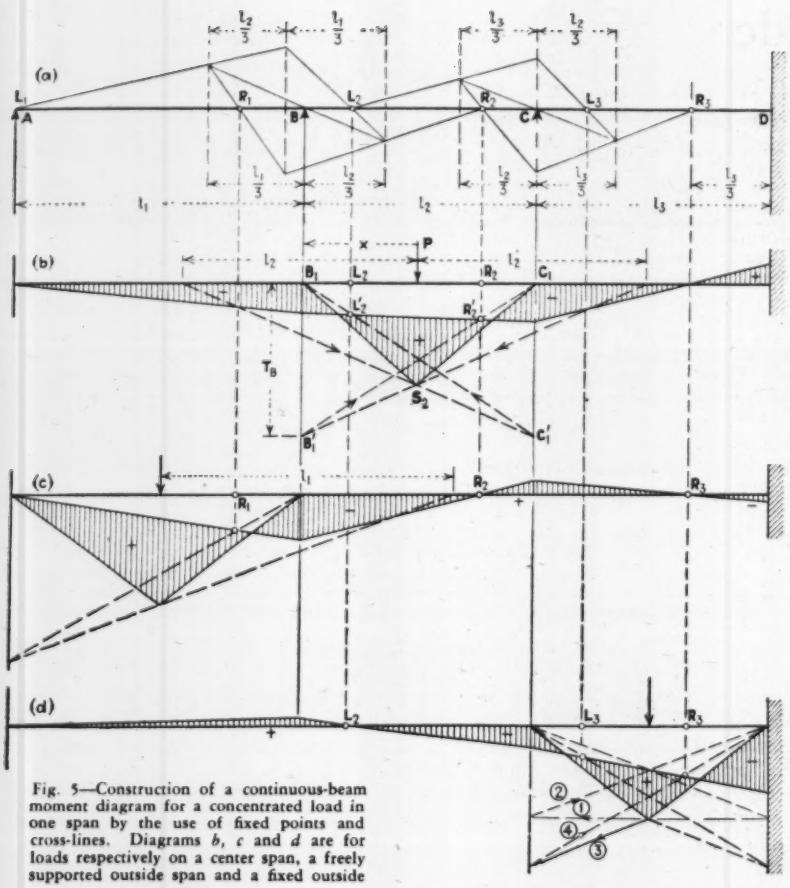


Fig. 5—Construction of a continuous-beam moment diagram for a concentrated load in one span by the use of fixed points and cross-lines. Diagrams *b*, *c* and *d* are for loads respectively on a center span, a freely supported outside span and a fixed outside span.

and this value divided by $\frac{l_2^2}{6}$ will give the cross-line distance

$$T_B = \frac{m\,(l + x)}{l}$$

This length may be constructed graphically in the following manner: Lay off on the base line (Fig. 5b) the length of the beam l_2 to the right from the load and draw a line from the point through the vertex S_2 to B'_1. Connecting the points, B'_1 and C_1, locates one of the cross-lines. The other cross-line may be found similarly. The closing line in this span is now easily found. Fig. 5b shows how the total moment area is drawn up. Figs. 5c and 5d show the construction for a load in an exterior span with free and fixed end respectively. The construction shown in Fig. 5d may be a useful expedient when space on the drawing is crowded. In this construction line 1 is drawn parallel to the beam. Then line 3, drawn parallel to line 2, locates the cross-line 4.

Applying the theory

In applying the fixed-point theory to actual problems, it is advisable to determine the moments for one span loaded at a time, using a unit-load, and to scale off the moments and mark them on the diagram. For four spans, use four moment diagrams, one for each span, and summarize the results. The unit-load diagram will then be basic, and moments for dead or live loads of any given amounts may be obtained by simple multiplication.

In Fig. 6 are shown the diagrams necessary for determining the moments in a fully restrained beam continuous over spans of 20, 30 and 20 ft. respectively and carrying a live load of 300 lb. per ft. Fig. 6a shows the graphical determination of the fixed points. The moment diagrams for loads on span *AB* and on span *BC* only are constructed in Figs. 6b and 6c. A load on span *CD* gives a moment diagram opposite hand to Fig. 6b. A unit load of 1,000 lb. per ft. is used, and for *AB* and *BC* as simply supported beams the moments are

$$M_1 = \frac{1{,}000 \times 20^2}{8} = 50{,}000$$

and

$$M_2 = \frac{1{,}000 \times 30^2}{8} = 112{,}500 \text{ ft.-lb.}$$

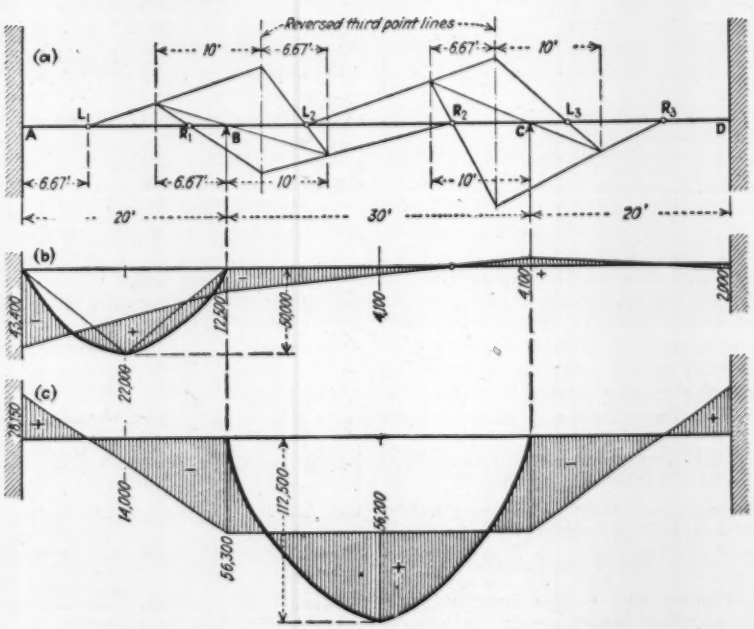
The moment-area ordinates are scaled off at the supports and at the center lines of the spans, as shown in Figs. 6b and 6c.

The loading assumed is: dead load 137, live load 300 and total load 437 lb. per sq.ft. A typical moment calculation follows for moment at support *A*, which will be a maximum for *D. L.* + *L. L.* on span *AB* and *CD*, and *D. L.* only on span *BC*.

D.L. + *L.L.* on *AB* = 0.437 × 43,400
D.L. + *L.L.* on *CD* = 0.437 × 2,000 / 0.437 × 45,400 = — 19,800
Less *D.L.* only on *BC* 0.137 × 28,150 = + 3,900

Total moment = — 15,700 ft.-lb.

Fig. 6—Moment diagrams for a three-span continuous beam.



Recent Areal Subsidence Found in Releveling

Changes in elevation of as much as 4 ft. since 1920 discovered over a large area centering on San Jose, Calif., by precise levels just completed, with all indications that the subsidence is still continuing

By Howard S. Rappleye
Chief, Section of Leveling, Division of Geodesy, U. S. Coast and Geodetic Survey

RERUNNING certain lines of first-order leveling in the area surrounding San Jose, Calif., has disclosed the fact that several benchmarks in that area have settled by amounts varying from a small fraction of a foot to a maximum of slightly more than 4 ft. This paper is based on a preliminary study of the results of the releveling, and the figures given are not to be considered as final, although they are very close to the values that will be derived from the final study. These values will probably not change the figures given by more than a tenth of a foot.

Original leveling—During the summer field seasons of 1911-1912, the Coast and Geodetic Survey extended a line of first-order or precise levels from Brigham, Utah, to San Francisco, Calif. The line followed the Southern Pacific Railroad, passing near its westerly end through Lathrop, Niles, San Jose and Redwood City and terminating in San Francisco on benchmarks established by the city engineer and referred to at the Presidio. (Results published in 1914 in Coast and Geodetic Survey Special Publication 22, now out of print.) In 1920 a line was run southward from San Jose along the Southern Pacific Railroad to Santa Ana. (Results published.)

First Releveling—During the winter of 1931-'32 a line of first-order levels was run from Eureka, Calif., southward to Sausalito, across the Golden Gate, and through San Francisco to a connection with the western end of the Brigham-San Francisco line in the southern part of San Francisco, and thence (under a cooperative agreement with the state department of public works) southward to San Jose. This part of the line followed a somewhat different route than the 1911-'12 levels, but at the same time connections were made to all of the recoverable benchmarks on the old line. The new leveling checked the old work within reasonable limits as far south as Redwood City; then the two lines began to diverge, the new leveling showing lower elevations than the old. The maximum divergence occurred on benchmarks P7 at San Jose, where the 1931-'32 elevation was 3.6 ft. lower than the 1911-'12 elevation.

Second Releveling—After the records and computations had been studied in the office and compared with the leveling of about twenty years earlier, it was decided that further field work was necessary in order to establish the facts in the case. Accordingly, in the winter of 1932-'33 the same men who had done the releveling the year before were sent back to the San Jose region for further work.

This party again reran the line from San Francisco to San Jose and continued along the route of the 1911-'12 levels north and east from San Jose until the evidence of settlement disappeared in the vicinity of Niles, and for a considerable distance beyond the disturbed region. The fieldwork was then continued southward from San Jose along the line of the 1920 leveling. This releveling served to establish Coyote as the approximate southern limit of the disturbed area surrounding San Jose.

From the results of this second releveling it is believed that we are perfectly safe in saying that the benchmarks established along the line from Brigham to San Francisco and located between Redwood City and Niles have settled by amounts ranging from a small fraction of a foot to a maximum of 4 ft. at San Jose. It is also safe to say that on the line from San Jose southward toward Santa Margarita the evidence of regional settlement disappears beyond Coyote, though the releveling from there to Santa Margarita has disclosed rather large movements of some individual marks. From Coyote southward there is no evidence of a continuous divergence between the old and new leveling. Such movements as have been noted can probably be traced to local disturbance of individual marks.

Subsidence extending from Redwood City south to Coyote and eastward to Warm Springs, with maximum of 4.1 ft. at San Jose, was found in releveling along the lines of Coast Survey benchmarks south and east from San Francisco.

Detail Changes — As far south as benchmark F7, which is located north of the Southern Pacific station at Redwood City, 21.9 miles north of San Jose, the total accumulated divergence between the leveling of 1912 and 1932-'33 was only about 1 in. This is not a sufficient divergence to be positively chargeable to movement of the benchmark at that place.

At benchmark G7, near the Oak Grove Villa Hotel at Menlo Park, 18.4 miles north of San Jose, the discrepancy amounts to 0.75 ft.; at H7, 0.9 miles farther south, on the Southern Pacific bridge over San Francisquito Creek, it was 0.5 ft.; 0.4 miles farther on, at I7, near the Southern Pacific station at Palo Alto, somewhat over 0.4 ft.; 1.6 miles beyond Palo Alto, at J7, near the Southern Pacific station at Mayfield, 1.6 ft. The next two benchmarks of the original line had been destroyed or moved, but at M7, located opposite the Southern Pacific station at Lawrence, 9.1 miles south of Mayfield and 6.4 miles north of San Jose, the settlement was approximately 1.75 ft. Finally, benchmark P7, at the eastern entrance of the Hall of Records at San Jose, showed the maximum settlement to be 4.1 ft. The survey of a year previous had shown the settlement here to be only 3.6 ft., which would indicate that this benchmark has settled ½ ft. in about a year.

Going on northward from San Jose, no positive recoveries of old marks were made until benchmark T7, at Warm Springs, was reached. Here the divergence had again reduced to about 0.2 ft., and beyond Warm Springs the settlement continued to decrease slowly until it practically disappeared in the vicinity of Niles.

Proceeding southward from San Jose toward Santa Margarita, the divergence between the leveling of 1920 and that of 1932-'33 gradually reduces until in the vicinity of Coyote the evidence of appreciable settlement has practically disappeared.

One significant feature of the second releveling is the fact that the old and the new elevations in the vicinity of Coyote are in such good agreement as to give a good indication that *between 1912 and 1920 no large settlement took place in the vicinity of San Jose.* This leads to the conclusion that the large settlement has occurred almost entirely since 1920. In view of the fact that the first and second relevelings showed a settlement of approximately ½ ft. at San Jose in the period of about one year, it would appear that the movement may still be going on.

Book Reviews and Notes

A Monthly Commentary on Current Additions to the Civil Engineer's Library

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A Timely Subject Discussed

INFLATION—By Donald B. Woodward and Marc A. Rose. Cloth; 5x8 in.; pp. 153; diagrams. Published by Whittlesey House, McGraw-Hill Book Co., Inc., New York and London. $1.50.

In these days when the average citizen has not yet recovered from the shock of reading in the daily paper that the dollar which he had been brought up to believe was worth 100 cents is really only worth about 85 cents, this book will be found to be of wide interest. Inflation a few months ago a subject of interest only to economists, has suddenly become of interest to almost everyone. The subject is here presented in a clear and concise form. The different kinds of inflation are explained, together with their merits and defects.

* * *

Technical Writing

THE ENGINEER'S MANUAL OF ENGLISH—By W. O. Sypherd and Sharon Brown. Flexible; 5x7 in.; pp. 526. Published by Scott, Foresman and Co., Chicago. $2.

The authors' purpose in the preparation of this manual was not to produce a textbook on formal rhetoric but rather a textbook of English composition for engineering students and a reference book on usage in technical writing for the practicing engineer. The book is divided into two parts, one devoted to the fundamentals of engineering writing, and the other (about half the book) to specimens of engineering writing. This latter includes various forms of reports, editorial writing, abstracts, book reviews, technical articles, bulletins and catalogs, and specifications.

* * *

Four Years of Regional Planning

FROM PLAN TO REALITY—By the staff of The Regional Plan Association. Cloth; 8x11 in.; pp. 142; halftones, maps and tables. Published by Regional Plan Association, Inc. New York. $2.

Regional plan work is looked upon all too frequently as something that produces a collection of charts and diagrams to be looked at and filed away as interesting but of little practical value. Few people realize how effective such work can be if the subject is kept before those responsible for local public works bearing on the general plan for the region. What has been accomplished in the New York Metropolitan District in the four years since the regional plan for that district was adopted is clearly set forth in this most recent publication of the Regional Plan Association. Obviously, many of the developments listed in this book as accomplishments under the regional plan were not specifically provided for in the plan as drawn four years ago; they have been included by the staff of the Regional Plan Association because they come within the general requirements laid down in the basic plan. Probably the most significant thing about the four-year development reviewed is that so few undertakings run contrary to the principles laid down in the plan completed in 1929.

* * *

Small College Architecture

ARCHITECTURAL PLANNING OF THE AMERICAN COLLEGE—Jens Fredrick Larson and Archie MacInnes Palmer. Cloth; 8x10 in.; pp. 181; photographs and line drawings. Published by McGraw-Hill Book Co., Inc., New York and London.

Publication of this work on the architectural planning of American colleges was authorized by the Association of American Colleges in 1931 as a complement to an earlier work, "College Architecture in America," published in 1929 as a joint endeavor of the association and the Carnegie Corporation. That book covered the entire range of college and university architecture and laid the foundation for the present work, addressed particularly to those concerned with the development of the small liberal-arts colleges.

* * *

Official Data on Hoover Dam

THE CONSTRUCTION OF HOOVER DAM—By Ray Lyman Wilbur and Elwood Mead. Cloth; 8x10 in.; pp. 94; numerous folding drawings. Published by the Superintendent of Documents, Washington, D. C.

This second official statement concerning Hoover Dam, published by the U. S. Department of the Interior, takes up the second stage of that great undertaking, actual construction. The first publication (*ENR*, March 23, 1933, p. 384) was concerned with the preliminaries, legislation, interstate agreements, power and water contracts, etc. This volume covers engineering investigations, preliminary operations, details of the design and progress of construction up to the end of 1932. Part V of the book relates to the All-American Canal. Included also are reports of the consulting board and the Colorado River Board, contracts for the work, including the full text of the main government contract with Six Companies, Inc., and all the drawings that were part of that contract.

Only a limited number of copies of these two books was printed, and the supply of the second volume, "The Construction of Hoover Dam," is exhausted. Copies of the first volume, "The Hoover Dam Contracts," still may be obtained from the Superintendent of Documents, Washington, D. C., at $1 a copy.

Utility Regulation by Commission

PUBLIC UTILITY REGULATION—By William E. Mosher and Finla G. Crawford. Cloth; 6 x 9 in.; pp. 612; tables. Published by Harper & Brothers, New York and London. $5.

SINCE 1907 nearly every state in the Union has established a commission to exercise control over the public utilities within its borders. With the rapid growth of these utilities, both in size and in influence, that has occurred in the past two decades, many have come to the conclusion that these commissions are falling far short of accomplishing the purpose for which they were set up. This view was strengthened by the revelations following the collapse of the Insull system.

The book under discussion here is an analysis and criticism of the organization and operation of the public utility commissions of the country and an attempt to set forth methods whereby they may be strengthened and made more effective in accomplishing their objectives. To provide proper background for the discussion, the authors have gone into an analysis of the principal subjects with which these commissions must concern themselves: Corporate organization and finance, accounting, depreciation, standards of service, valuation, rate of return, rate structures for electricity, gas, water, telephone and street railways, holding companies, interstate problems, motorcarrier operation, rural electrification, grade-crossing elimination and public relations.

Miscellaneous Notes on Booklets and Reprints

TESTING THE FIRE RESISTANCE of building material is the subject of a paper published by Statens Provningsanstalt, Stockholm, Sweden, under the title Provning av Brandsäkerheten hos Byggnadsmaterial och Konstruktioner. The summary and conclusions are printed in English.

THE ANNUAL REPORT of the Netherlands government Institute of Sewage Purification for the year 1931 has been published under the title Rijksinstituut

voor Zuivering van Afvalwater, Jaaverslag, 1931; The Hague, Holland. Price 1 florin.

AIRPORTS AND LANDING FIELDS in the United States are described in Airway Bulletin No. 2 of the Aeronautics Branch, U. S. Department of Commerce, Washington, D. C.

TESTS OF ANCHORAGES for reinforcing bars as conducted at the University of Iowa are described in Bulletin 3, Studies in Engineering, University of Iowa, Iowa City, Iowa. Price, 50 cents.

RUNOFF RECORDS FOR OHIO Rivers, together with areas of lakes and of river drainage basins within the state, are given in Bulletin 73, of the Engineering Experiment Station, Ohio State University, entitled "Ohio's Stream Flow, Part 1 — Areas of Lakes and Drainage Basins; Runoff Records Prior to 1921." The bulletin represents the first extensive inventory of Ohio's surface waters and should be of special interest at this time when the setting up of conservation or flood control districts for river valleys is under discussion. Contained in the report is interesting information on the effect of forests on runoff. Copies of the report may be obtained from the Experiment Station, Columbus, Ohio. Price $1.

New Books and Revised Editions

[Those desiring copies of the books listed below or mentioned elsewhere in this section should order them from the publishers or from their local booksellers.]

ACCOUNTING MANUAL FOR SMALL CITIES—By Carl H. Chatters. Paper; 7x10 in.; pp. 79; tables. Published by Municipal Finance Officers' Association of the United States and Canada, Chicago, Ill. $1.

DER GRUNDBAU—By L. Brennecke and Erich Lohmeyer. Liferung 3 (Bogen 11 bis 13). Paper; 7x10 in.; pp. 47; halftones and line drawings. Published by Wilhelm Ernst & Sohn, Berlin. 3.40 RM.

ERLAUTERUNGEN ZUDEN EISENBETON - BESTIMMUNGEN — By W. Gehler. Paper; 5x7 in.; pp. 320; diagrams and tables. Published by Wilhelm Ernst & Sohn, Berlin, Germany. 5.50 RM.

PRINCIPLES OF MECHANISM—By Alex Vallance and Marshall E. Farris. Cloth; 6x9 in.; pp. 333; halftones and line drawings. Published by The Macmillan Co., New York. $3.50.

REINFORCED CONCRETE WATER TOWERS, BUNKERS, SILOS AND GANTRIES—By W. S. Gray. Cloth; 6x9 in.; pp. 256; halftones, line drawings and tables. Published by Concrete Publications, Ltd., London. 10s.

STANDARDS AND SPECIFICATIONS FOR METALS AND METAL PRODUCTS 1933—Prepared by George A. Wardlaw, under the direction of A. S. McAllister, Chief of the Division of Specifications, U. S. Bureau of Standards. Cloth; 8x11 in.; pp. 1,359; tables, halftones and line drawings. Published by Superintendent of Documents, Washington, D. C. $3.

STOP THAT SMOKE—By Henry Obermeyer. Cloth; 6x9 in..; pp. 289. Published by Harper & Brothers, New York. $2.50.

WHAT ELECTRICITY COSTS—A Symposium, edited by Morris Llewellyn Cooke. Paper; 5x7 in.; pp. 231; halftones and tables. Published by New Republic, Inc., New York. $1.

VOCATIONAL GUIDANCE IN ENGINEERING LINES—Elicited and Edited by the American Association of Engineers. Editorial Committee: J. A. L. Waddell, chairman, the late Frank W. Skinner, Harold E. Wessman. Cloth; 6x9 in.; pp. 521; photographs. Published by The Mack Printing Co., Easton, Pa. $2.50. **[The price of this book was incorrectly stated in our issue of May 25.]**

Chicago Sanitary District Costs Reduced Under Changed Plans

Activated-sludge treatment and incineration adopted, thus eliminating sludge digestion and drying beds—Large acreage released makes possible consolidation of two sites into one

WITH but five and one-half years left in which to complete the plants for the treatment of sewage of the Sanitary District of Chicago, a new estimate of $120,367,500 has been made as of June 1, 1933, based on various reductions due to lowered construction costs, economies of design and materials and elimination of processes and equipment found to be unnecessary as the result of operating experiences. The report on which this estimate was made has been adopted by the Board of Trustees as official.

On April 21, 1930, when the decree of the Supreme Court laid on the Sanitary District the task of building by 1938 sufficient works to permit reducing the lake diversion from 6,500 to 1,500 sec.-ft., the estimate was $179,744,000, based on prices and methods then prevailing. Since then the District has spent $10,732,000. The remainder of the reduction is due to the causes noted above.

Activated sludge is retained as the method best suited economically and otherwise to the requirements of the problem. This holds true also when taking into consideration any reasonable restrictions relative to patent rights. However, the plants will be built to take advantage of future improvements.

Developments in the dewatering and incinerating of sludge have made possible the elimination of any future construction of digestion tanks or sludge-drying beds, thereby making it possible to build both the Southwest Side treatment works and the West Side works on the site now owned, originally purchased for the West Side treatment works, and to combine the activated-sludge portions of the two plants. This combination will eliminate the purchase of land, duplicate blower houses, sludge return pumping stations, air mains, dewatering and incinerating plants and a bridge across the Main Channel. The cost of the Southwest Side intercepting sewer will be increased thereby because of the greater length required; also because of an increase in the size of this sewer, since it has become necessary to handle a greater proportion of the flow from the West and Southwest Side project areas at the Southwest Side sewage pumping station. The net result will be a saving now estimated at $17,108,000.

In joining the Southwest Side treatment works with the West Side works, it is proposed to use the West Side Imhoff tanks (two batteries completed and the third about 60 per cent completed) for digestion of sludge up to the economical capacity of the present sludge-drying beds, and for temporary storage of peak-load solids. This storing of sludge will reduce peak loads on the dewatering and incinerating plant. It is not proposed to extend the construction of Imhoff tanks or sludge-drying beds. In the distant future the sludge-drying beds may even be eliminated after they have served a useful life if the space is needed and the dewatering and incinerating of sludge have developed to a point that would make this step desirable. In such a case the Imhoff tanks may still be used for storage and partial digestion of sludge to reduce peak loads on the dewatering and incinerating plant, but all of the digested sludge would be disposed of by dewatering and incinerating.

Contingent on finances being made available shortly, the following schedule has been worked out for the distribution of the contracts, allowing only the shortest time required to design the works in an orderly sequence and the least time for construction. The estimates are based on 1931 prices with newly computed quantities and new designs.

The cost of controlling works is included in this estimate, although under the decision of the Supreme Court of May 22, 1933, this construction is not mandatory unless such works are later deemed necessary.

The engineering department is proceeding with the design and preparation of plans according to the new schedule with the dewatering and incineration of sludge and combination of West Side and Southwest Side plants.

The report, which has the approval of the Board of Trustees, was prepared by Philip Harrington, chief engineer, and concurred in by H. P. Ramey, assistant chief engineer, Langdon Pearse, sanitary engineer, and L. C. Whittemore, engineer of design.

Engineering News-Record

EDITOR—F. E. Schmitt. EDITORIAL STAFF—V. T. Boughton, W. G. Bowman, F. W. Herring, C. S. Hill, H. W. Richardson, W. W. DeBerard, N. A. Bowers, J. I. Ballard.

Editorial and Publishing Offices at 330 West 42d St., New York; 520 North Michigan Ave., Chicago; 883 Mission St., San Francisco; Aldwych House, London, England.

Subscription price $5 per year in the United States; foreign rates on application.

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JUNE 29, 1933 Volume 110 Number 26

Energy and Vigilance

BY NOW any uncertainty as to whether the public-works program of the Recovery Act would be delayed has been dispelled. The delay is unmistakably real, and the fact lends strong emphasis to what was said in this column a week ago—that in the interest of most rapid ultimate progress it is imperative to make use of the period of postponement for developing every state and city project in thorough detail. In another fortnight the President's return should clarify the situation arising from the present temporary system of administration and should start the program in operation. Projects that are then ready will be able to serve as immediate means to the re-employment upon which economic recovery is to be built. Legal and financial as well as technical features of projects should therefore be perfected so as to remove every impediment to a prompt start when the final working machinery of the act begins to function. This calls for great energy and determination. And it would be well if to these were added wise caution. When it became apparent that the program was postponed, politics began to stir in the state capitals, and they are now seething with activity directed toward making the public-works administration subservient to local politics. Of course, it is unthinkable that the national administration will fail to guard adequately against the menace of such attempts. Yet it will be of great value if all authorities and engineers engaged in planning for construction re-employment remain vigilant to protect their projects from entanglement with politics or self-interest. By such vigilance added to energy in perfecting the projects they can contribute materially to the progress of recovery.

The Surveyor's Discovery

A DISCOVERY of first-rank importance has been made by the Coast and Geodetic Survey in finding and verifying the remarkable areal subsidence centered at San Jose, Calif., reported this week. Nothing like it has been observed before. Earlier known changes of level were either localized sinkings over mines and the like or else cataclysmic displacements such as the formation of Reelfoot Lake during the New Madrid earthquake a century ago. These offer no parallel to the San Jose phenomenon; nor is the very slow rising or sinking of some coast lines in any way like the present progressive and rapid movement of half a foot in a year. Until its cause and significance are learned, one point should be noted—namely, that the subsidence was detected only by virtue of the fact that a line of precise-level benchmarks had been established in this area and that unexplained discrepancies in local survey elevations led to rerunning the line. Since the meshes of the world's level network are large, it is not impossible that other subsidences of the kind have occurred elsewhere, remaining undetected because no precise elevations were known. But at least in the eastern part of the United States, where the level lines have been subject to numerous checks, it is improbable that such a movement has occurred in a period of many decades. This part of the country is considered to be relatively stable geologically and seismically, and it may therefore be that the San Jose subsidence, occurring between two fault lines, is related to past tectonic movements.

Work Relief

MANY CITIES have abandoned most of their "work relief" for "direct relief" because of poor showing made by the work-relief operations. Those who have continued it despite discouraging results will find new encouragement in what has been accomplished in Oklahoma City, as outlined in this issue. When the work was started in Oklahoma City, the same disheartening elements were present that have affected such work elsewhere—inexperience, lack of physique for hard manual labor, ineptitude or inefficiency. But a careful weeding-out process finallly built up a working force that produced very creditable results. While the author modestly refrains from saying so, the careful reader of the article on the Oklahoma City work will read between the lines that the success of the work there is not due so much to the novelty of the plan adopted as to the intelligence with which the work was directed.

Hidden Elements of Cost

A WORD of caution should be given to those who read the surprisingly low figures for the cost of the sewer and water-main work done by the work-relief forces in Oklahoma City. It is stated that property owners secured sewers at a cost of about $10 per 50-ft. lot instead of from $90 to $100 for similar work under the special-assessment contract method similarly employed. The $10 represents *only* the property owner's direct outlay for materials. Indirectly he paid part of the labor cost through his share of the city's outlay for the relief work, and still more indirectly through the federal government's contribution to the cost of the work. Further, the laborers were not being paid a living wage—the wage that a laborer must be paid under normal circumstances. Thus, while the property owner appears to be getting a special bargain, there are hidden elements of cost that he pays indirectly, and the relief worker involuntarily contributes work that on a voluntary basis could be bought only at a higher figure. The figure of $10 per 50-ft. lot must not be set up as a criterion for future work of a similar character.

A Highway Balance Sheet

A BALANCE SHEET of the highway has been one of the greater deficiencies under which public-roads officials have had to labor in presenting the proof of the solvency of the great business that they are carrying on. Does the highway pay interest and profits on the vast investment that it is absorbing? In this issue and in two others to follow, the answer, based on determined figures, is undertaken by the director of the Highway Research Board of the National Research Council. It deserves careful study for the particular reason, if for

no other, that the argument is based on determined figures of expenditures and income. While these basic data are too scant to be indisputable, they do point only to the one conclusion that the improved road systems of the states are self-liquidating investments as measured by the cold figures of costs and earnings. The result should encourage more factual analyses of highways as going businesses. In no other way can the road official so well disprove the frequent claim that highway improvement has been carried so far that the country can well afford to decrease its public-roads expenditures. In brief, the highway has definite need of a balance sheet.

Curbing Silicosis

SILICOSIS can no longer be ignored as an outstanding construction hazard. When some 200 silicosis damage suits aggregating $4,000,000 are filed against a single contractor at the completion of a three-mile tunnel job, the possibilities of trouble are too plain to be overlooked. The first suit tried in this instance ended in disagreement, but the ultimate outcome may prove serious.

Work on the tunnel in question was carried on by the best procedure known, with use of all reasonable precautions, including wet drilling and proper ventilation, and it has not yet been proved that silicosis was actually contracted by any of the workers on this job. Nevertheless the contractor is subject to large expense to prove that he is innocent of negligence—the charge on which the suits are based. As the state in which the work is located has no compensation laws recognizing the disease, he is exposed to the possibility of costly verdicts against him.

Unfortunately, few contractors know anything of silicosis, which is a respiratory disease caused by prolonged exposure to dust containing free silica. As silica, or silicon dioxide, is present in most rock formations, nearly every rock-drilling job involves the hazard of silicosis. The causative conditions of the disease are not well known. Medical authorities disagree as to the length of time of exposure necessary to contract the disease, but they say that the degree of susceptibility depends upon the general health of the individual workman. They describe the disease as a fibrous condition of the lungs set up by breathing of microscopic particles of free silica. The particles under 10 microns (0.0004 in.) in size are dissolved by the liquids of the lung tissue to form a silica gel or colloid, which causes the fibrosis. No cure being known, prevention is the only way to fight silicosis.

Prevention of dust in rock drilling is admittedly a difficult task. Wet drilling alone seems to be ineffective. Some effective method of dust collection at the drill hole will doubtless be developed, but if this is to come about rapidly it will only be through full cooperation between contractor, equipment manufacturer and health authorities. Speedy progress is of utmost importance at the present stage, for men are in danger of contracting silicosis, and contractors are becoming liable to damage suits every time a drill is operated.

Two dust collectors have already been demonstrated. A device of central-plant vacuum type was shown at Rockefeller Center in New York a year ago, but little has been heard of it since. Another was shown in New York recently. The latter device, a portable unit designed for one or two drills, is promising, but still lacks full test of its dust-collecting efficiency. One or two other dust collectors are reported to be in process of development. Perhaps we may have a workable dust-collecting device for rock drilling in the early future. Collection of dust at the drill hole is likely to reduce the silicosis hazard materially, though the dust created by blasting and handling of muck will still have to be taken care of, and suitable compensation laws will have to be framed.

One protection is available to every contractor even now, namely, medical examination of workers at the start of the job and at intervals during its progress. Workmen with weak lungs or showing designs of susceptibility to lung diseases should not be allowed on rock-drilling jobs. Contractors can further protect themselves by studying the disease and its causes, and by calling for aid on the U. S. Bureau of Mines, which has offered its services in the fight against silicosis. Vigilance and better knowledge are the prime safeguards under the limited present knowledge. When adequate dust collectors are available, the situation is likely to be radically changed.

The Code for Contracting

THE contracting business must prepare itself for a new regimen. By the terms of the Industrial Recovery Act, which hands contracting and allied businesses of construction a $3,300,000,000 order for labor, materials and machinery, these businesses along with all other major business and industrial operations become in the eyes of the law public-service agencies and subject to regulation. Independence, individualism, buy-and-sell-as-you-please policies, cease to exist in contracting as they have been interpreted in the past. These are facts to which contractors must promptly adjust their thinking and remold their business organization and practices.

This week in Chicago the Associated General Contractors are taking final action on a proposed code of business practice to conform to the terms of the law. In general, this code embodies fair provisions for all branches of contracting. Whether or not it goes into force unmodified (for it yet must undergo the scrutiny of other businesses with allied privileges), some code will be formulated, and its acceptance by the administrator of the Industrial Recovery Act will make all contracting virtually subject to its terms. Contracting cannot evade organizing its business to some code of rules. Whether they regard the change as one for better or worse, contractors will be required to adjust their practices to conform to the new order of doing business. They should recognize the facts and cooperate in bringing about the best adjustment possible in a complex situation.

Success in the task will depend largely on coordinated action. Through the breadth of the business, contracting has shown vast indifference to cooperation. Its associations for mutual effort have had the support of only a handful of all contractors. In the new order, organization will call for more attention. Regulation will be predicated on organized sentiment, and the greater its concentration the greater will be its influence. Participation in association activities locally and nationally is many times more important under the new order than it has ever been previously. The Industrial Recovery Act requires, as never before has been required, that contracting shall organize for education and action.

NEWS OF THE WEEK

Highway Funds Allotted to State by Recovery Board

ALLOCATION of the $400,000,000 for highway work provided under the National Industrial Recovery Act was made to the several states by the public works board at its meeting held on June 23. The allocation by states is given in an accompanying table.

At the same meeting the board took under consideration a program of construction totaling $135,000,000 submitted by the War Department. It included airports, hospitals and housing, ordnance depots and warehouses and improvements to national military parks and cemeteries.

Highway regulation

At the time the allocation of the highway funds was announced, the special board for public works issued a set of rules and regulations to govern the emergency construction to be financed thereby.

All projects located on the federal-aid highway system outside of municipalities are to be designated as National Recovery Highways projects with the letters "NRH" added to the project number and all projects on extensions of the federal-aid system into or through municipalities are to be designated National Recovery Municipal Highway projects with the letters "NRM" added. All projects located on secondary roads are to be designated National Recovery Secondary Highway projects with the prefixed letter "NRS." The latter roads are defined as those not included in the federal system, but which are either part of the state highway system or are improved local highways reaching to shipping points.

Distribution of funds

Not more than 50 per cent of the funds apportioned to any state shall be applied to the federal system outside of the municipalities, not less than 25 per cent shall be spent on the extension of the federal system into or through municipalities and not more than 25 per cent shall be applied to secondary or feeder roads until provision has been made for the completion of at least 90 per cent of the initial federal-aid system of the state. Provision is made for modification of the percentages assigned to work within municipalities.

Each state highway department is required to submit to the special board for public works a preliminary statement of the apportionment of its funds, the chief limitation upon this apportionment being that some work must be provided in at least 75 per cent of the countries of the state unless it can be shown that employment does not require it, or that projects cannot be found. Upon approval of the preliminary statements, detailed statements for each of the three classes are to be submitted.

In the selection of projects to be included, priority shall be given to (a) the closing of gaps in the federal-aid highway system; (b) the appropriate landscaping of parkways or roadsides on a reasonable extensive mileage; (c) the correlating and supplementing of existing transportation facilities by road, rail, air and water, and providing of service to freight receiving stations, airport and emergency landing fields; (d) reconstruction designed to reduce maintenance costs and decrease future state and local highway expenditures; (e) providing a large number of small projects designed to employ the maximum of human labor; and (f) the elimination of hazard to highway traffic through grade separation or relocation to eliminate dangerous crossings, widenings narrow bridges and roadways, replacement of unsafe bridges, building of footpaths, the construction of routes to avoid congested areas, and the construction of facilities to improve accessibility and the free-flow of traffic.

HIGHWAY ALLOTMENTS TO STATES—

Alabama	$ 8,370,133
Arizona	5,211,960
Arkansas	6,748,335
California	15,607,354
Colorado	6,874,530
Connecticut	2,865,740
Delaware	1,819,088
Florida	5,231,834
Georgia	10,091,185
Idaho	4,486,249
Illinois	17,570,770
Indiana	10,037,843
Iowa	10,055,660
Kansas	10,089,604
Kentucky	7,517,359
Louisiana	5,828,591
Maine	3,369,917
Maryland	3,564,527
Massachusetts	6,597,100
Michigan	12,736,227
Minnesota	10,656,569
Mississippi	6,978,675
Missouri	12,180,306
Montana	7,439,748
Nebraska	7,828,961
Nevada	4,545,917
New Hampshire	1,909,839
New Jersey	6,346,039
New Mexico	5,792,935
New York	22,330,101
North Carolina	9,522,293
North Dakota	5,804,448
Ohio	15,484,592
Oklahoma	9,216,798
Oregon	6,106,896
Pennsylvania	18,891,004
Rhode Island	1,998,708
South Carolina	5,459,165
South Dakota	6,011,479
Tennessee	8,492,619
Texas	24,244,024
Utah	4,194,708
Vermont	1,867,573
Virginia	7,416,757
Washington	6,115,867
West Virginia	4,474,234
Wisconsin	9,724,881
Wyoming	4,501,327
Dist. of Columbia	1,918,469
Hawaii	1,871,062

Replacing rail lines

The Secretary of the Interior and the board reserved the right to require the construction of roads desired by the U. S. Railroad Coordinator to provide adequate year-round highway service in replacement of branch line railroad service.

Surveys and plans

Surveys and plans, specifications and estimates on the "NRH" and on the "NRM"

(Continued on page 852)

Codes Outlined for Trade Groups and Industries

REQUIREMENTS for basic codes for the major industries and trade associations were outlined by the National Industrial Recovery Board at its organization meeting held on June 19. The board consists of the Secretary of Commerce, chairman; Attorney-General; Secretary of the Interior; Secretary of Agriculture; Secretary of Labor; Hugh S. Johnson, administrator of the Recovery Act; the chairman of the Federal Trade Commission; and the Director of the Budget.

The requirements are laid down in Bulletin No. 2, National Recovery Administration, entitled Basic Codes of Fair Competition. In it the administrator urges upon the major industries and trade associations to submit without delay a basic code covering only such agreements as are consistent with the policy of the Recovery Act respecting maximum hours of labor, minimum rate of wages and such means as each industry may find necessary to protect its constructive and cooperative majority from wasteful and unfair competition of minorities. Modifications and additions will be considered at a later date. The conditions to be met in such codes were set forth in the Recovery Act itself (*ENR*, June 22, 1933, p. 814). The bulletin explains these requirements more fully and outlines the policy to be followed at hearings upon the codes submitted to the administrator.

In a statement made subsequent to the publication of Bulletin 2, General Johnson stated that industries would be permitted to make price-fixing agreements to the extent that they agree not to sell below cost of production.

Illinois Buys Cement for Roads in Open Market at Saving

Under a new law permitting open market purchase of cement for State highways in case bidding procedure does not produce reasonable prices, Illinois on June 22 purchased 2,000,000 barrels of cement from the Marquette Cement Co. at $1.44 per barrel. This price is 18 cents less than sixteen companies had bid in April, the third of a series of bids on 3,300,000 barrels, all rejected by the state. The law permits purchase at not to exceed 90 per cent of the last lowest bids. Work is to be resumed by many contractors throughout the state who have been unable to proceed until the state-furnished cement is delivered to them. In the negotiations, in which only the Marquette company participated, it was explained that 30,000 men could go to work at once on 54 major paving projects. The negotiation followed the order of the governor to file condemnation suits to obtain the cement. Presumably these suits will not now be filed.

H. M. Waite and J. F. Coleman Added to Public Works Staff

Henry M. Waite, former general manager of the Cincinnati Union Terminals Co. and John F. Coleman, consulting engineer, New Orleans, have been added to the staff of Donald H. Sawyer, temporary administrator of the public works section of the Recovery Act, according to an announcement by Secretary Ickes made on June 22. Colonel Waite is one of the engineers who has been serving voluntarily as an unofficial member of the staff of Hugh S. Johnson, and up until the time the act was approved it was expected that he would be named an assistant administrator to give special attention to state and municipal work. His early engineering experience was gained in 20 years of railroad work, following which he became chief engineer for the city of Cincinnati, serving as such from 1912 to 1914. In 1914 he became city manager of Dayton, Ohio, and remained there until he entered military service in 1918. During the war he served as a colonel in the Transportation Corps, first as chief engineer of the corps, then as assistant deputy general of transportation, Second Army, and subsequently in the same position with the Third Army in Germany.

John F. Coleman has been serving as a member of the engineering advisory board of the Reconstruction Finance Corp. since its organization. This board has passed upon projects submitted to the R.F.C. for self-liquidating loans. Mr. Coleman is a past president of the American Society of Civil Engineers and has been in general consulting engineering practice since the early part of the century. Previous to that he was engaged in city work, in river and harbor improvements and on railroad construction and maintenance.

Jackson County Courthouse Awarded to Third Low Bidder

The refusal of the George A. Fuller Co., Chicago contractor, to comply with bidding requirements is reported to have been the cause of awarding contract for the new Jackson County Courthouse at Kansas City, Mo., to the third low bidder, the Swensen Construction Co., of Kansas City, after the second bidder had withdrawn. The Swensen Co. bid $2,073,609, but agreed to meet the Fuller low bid of $1,975,000, when the county court held that the Fuller Co. did not live up to requirements. In calling for bids the county court provided in the proposal that each bidder submit the names of its sub-contractors and that the approval of them by the court should become a part of the contract. The Fuller Co., according to Superintendent Dunn of the court, submitted the names of several contractors for each of the different trades and declined to be bound by the contract to any one subcontractor on any one type of work. Other provisions of the proposal, dictated by a Missouri statute, call for preference to be given to materials and supplies manufactured or produced in Missouri. Superintendent Dunn reported that as the Fuller Co. refused to agree to approval of subcontractors by the county court the statutory provision giving preference to Missouri products was endangered, and recommended that the low bid be rejected.

Approval of State Boards Required For Projects Under Recovery Act

ALL state and other local projects put forward for financing under the Recovery Act must first have the approval of state administrators before they are submitted to Washington for approval, according to an announcement by Secretary Harold L. Ickes, chairman of the Special Board of Public Works. State administrators have not yet been named and will not be named until after the President returns to Washington about July 1. Governors, Senators and Congressmen have been asked to submit a slate of three names for the President's consideration. State administrators are to have a very small permanent staff. Most of the legal, financial and engineering work is to be done on a per diam basis, according to Secretary Ickes.

The office of Donald H. Sawyer, temporary administrator, has been moved to the Interior Dept. building to keep it separate from that of General Johnson.

Projects already sent to Washington are to be returned to the state administrators. Application blanks are now available.

State projects

The local administrators will require that projects possess the following requisites in order to receive consideration:

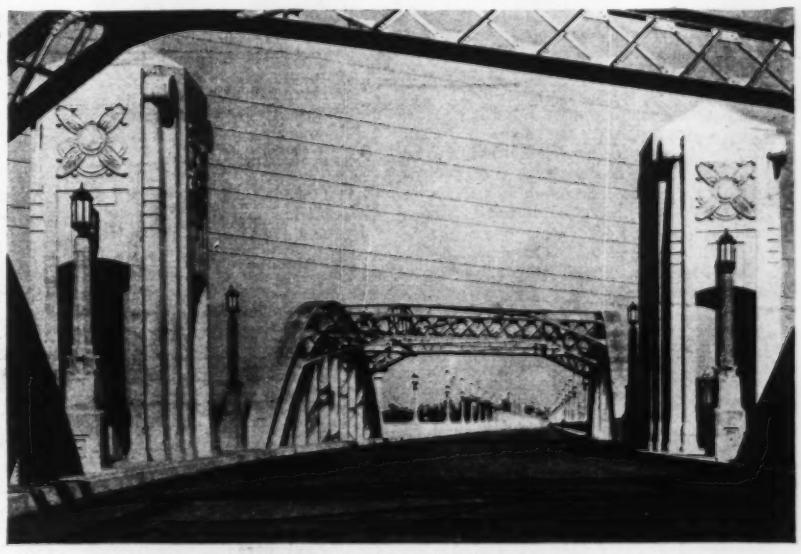
1. The project should be socially desirable in the sense of contributing something of value to the equipment of the community and should not be a mere makeshift to supply work.
2. No work should be constructed which would require for its maintenance or operation an additional outlay by the Federal Government.

The priorities to which different classes of projects should be entitled are as follows:

1. Projects which can be entered upon at once and completed with reasonable speed should be preferred to projects which would be spread over a relatively long period. This is in order to stimulate immediate revival of employment and industrial activity.
2. Projects which are located in or near a center of unemployment should be preferred so far as practicable to those located in areas where the problems of unemployment is less acute.
3. Projects which are integrated with other projects into a significant plan should be preferred to projects which are isolated and unrelated.

R.F.C. projects transferred

As the power of the R.F.C. to make self-liquidating loans was terminated on June 26 by the Provisions of Title III of the Recovery Act, Donald H. Sawyer has asked the R.F.C. to pass on to him its data concerning many projects found by it to be sound financially but not eligible for loans under the limitations of the Relief Act of 1932. Col. Sawyer believes that many of these projects will be eligible under the more liberal provisions of the Recovery Act. Final action upon them, however, must wait the President's return.



EAST SIXTH ST. VIADUCT OF LOS ANGELES OPENED TO TRAFFIC

Ceremonies of formally dedicating and opening for use the recently completed East Sixth St. viaduct over Los Angeles River at Los Angeles were held June 16. Construction of the viaduct, built at a total cost for land and structure of $2,382,275, was authorized by a bond issue carried by popular vote in 1926, and actual work was started by J. F. Knapp, Oakland, Calif., contractor, in May, 1931. The structure was designed by Merrill Butler, Los Angeles city engineer of maintenance and operation, under the direction of J. J. Jessup, Los Angeles city engineer.

The total length of the span and approaches is 3,546 ft. The overall width is 71 ft. and the roadway width between curbs is 56 ft. Providing a direct connection between the Los Angeles Metropolitan District and the large business and residential section of the Whittier Boulevard area, the new bridge connects Whittier Boulevard at Boyle Ave. with Sixth St. at San Mateo St.

The construction cost of the viaduct and approaches was $1,877,674. The cost for land and property damages was $505,621. Of the total the city and county each paid 37.5 per cent of the cost and Santa Fe and Union Pacific each 12.5 per cent.

Highway Funds Allocated By Public Works Administrator

(Continued from p. 850)

projects must be paid by the state unless it can demonstrate that it has inadequate funds. Payment for this work on the "NRS" projects and for the actual cost of construction engineering and inspection may be paid from the federal funds. No part of the cost of surveys, plans and engineering supervision of construction will be paid to any state which restricts employment of engineers on such work to residents of the state, unless it shall be shown that a sufficient number of qualified engineers, trained in highway construction, are available in the state.

Contract work

All contracts shall require the contractor to furnish all materials entering into the work and no requirements shall be contained in any contract in any state providing price differentials for, or restrict the use of materials to, those produced within the state. Preference shall be given to the use of materials produced under codes of fair competition approved under the Recovery Act. No convict labor shall be employed, and no materials manufactured with convict labor shall be used.

Wage rates are to be predetermined by the highway department and stated in the call for bids and also in the bids themselves, the rates to be minimum rates for both skilled and unskilled labor sufficient to provide a standard of living in decent comfort.

Except in executive and supervisory positions, so far as practicable and feasible, no person shall be permitted to work more than 30 hours in one week. This requirement shall be construed (a) to permit working time lost because of inclement weather or unavoidable delay in any one week to be made up in succeeding weeks of any one calendar month, and (b) to permit a limitation of not more than 130 hours work in any one calendar month to be substituted in the contract for the requirement of not more than 30 hours work in any one week on projects in localities where a sufficient amount of labor is not available in the immediate vicinity of the work. In remote localities where the entire personnel has to be housed and where the unemployed have been absorbed, the limit is raised to 40 hours a week, and not over 8 hours a day.

Hand labor requirements

The regulations require that "the maximum of human labor be used in lieu of machinery wherever practicable and consistent with sound economy and public advantage."

The Recovery Act funds may be used in lieu of state funds to match federal aid funds and the latter may be used to the maximum extent legally permissible on the construction and reconstruction of federal-aid highway system projects.

All contracts shall require that materials and supplies used have been produced or mined in the United States unless a sufficient supply is not available.

All plans and contracts are subject to approval of the Bureau of Public Roads, and approval will not be given to any procedure designed to prevent the award of contracts to qualified contractors nonresident of the state in which the work is located.

General Contractors Approve Draft Code Under Recovery Act

GENERAL CONTRACTORS from all parts of the country met at the Palmer House, Chicago, June 26 and 27 to consider and approve an industry practice code under the Recovery Act. Some 130 representatives of more than 2,000 contracting firms attended the meeting, which was called by the Associated General Contractors of America on behalf of the industry.

A draft master code, which had been prepared some weeks ago by a conference of various branches of the industry and then had been repeatedly circulated for criticism and revised, was presented to the meeting, and after discussion and revision was approved for submission to Hugh S. Johnson administrator of the industry control section of the Recovery Act. To deal further with the code a national industry executive committee was provided for, to comprise representatives of the A. G. C. and of the non-member contractors. It is proposed that state committees be set up to deal with disputes under the code and to take up matters referred to them by code committees of local organizations. In view of differences in industrial and working conditions between different regions and different classes of work, only the general provisions applicable throughout are embodied in the master code. The intention is to have each regional or class group prepare its supplemental code for use in conjunction with the master code.

A working-time limitation of 150 hours for a calendar month is proposed, in place of a maximum for daily or weekly work, to give the necessary flexibility for adaptation to weather and work conditions. Wage minimums are recommended to be set for public emergency work by the public-works administration.

The work of the meeting, not completed as this is written, is expected to include a division of the country into zones or districts for code and administrative purposes, and plans for procedure in organizing local and class-of-work groups. Organization of specialist and subcontractors has not yet been undertaken.

A fuller report will be given in a subsequent issue.

Bids Asked for 2,800 Towers on Boulder Dam Transmission Line

Bids have been requested July 14 by the Los Angeles Municipal Bureau of Power and Light for the manufacture of structural steel for towers carrying the high voltage transmission line that will connect the city's electric system with the federal hydroelectric project at Boulder Dam. At least 2,804 towers from 55 to 90 ft. high, involving 28,000 tons of structural steel, will be used. Of this number, 2,533 will be single circuit and 171 will be double circuit. Over 210 miles of desert country from Cajon Pass to the dam site, the towers will be placed 1,000 ft. apart. These will be of the single circuit type. From Cajon Pass to Los Angeles, a distance of 60 miles, the double circuit type of tower will be used, spaced about 800 ft. apart.

Kansas Rounds Up Projects Totaling $17,000,000

Public works projects in Kansas other than roads eligible for consideration under the National Industrial Recovery Act, aggregate about 17 million dollars, according to a committee appointed by the governor to report on the subject. These include water supply, sanitation, state lakes, public buildings, etc. Governor Landon in making the announcement stated the aim of the committee's endeavors to be cooperation with the federal administrator in getting work underway in Kansas.

Ernest Boyce, a member of the committee and chief engineer of the state board of health, and Earle G. Brown, executive director of the state board, have sent a letter to all city officials urging that "those projects that are needed and are useful to the people of the state should receive early consideration," and offering all possible cooperation to the cities in getting any desired work included in the public works program.

W. V. Buck, state highway engineer, stated that Kansas' share of the $400,000,000 grant would be spent in carrying out the normal program which was mapped out several years ago but postponed. Among possible important projects is a Missouri River bridge at Atchison. The state also has several important state routes graded and provided with new bridges; these will be paved. Important work now underway which is assured of completion by virtue of the federal funds, includes a long continuous-girder viaduct railway grade separation on North Lawrence Ave. in Wichita and the approaches to the new Kaw River bridge which is a part of the ambitious 7th St. Trafficway that Kansas City, Kans., is undertaking. The trafficway extends across the entire city from the Kaw River on the south to the Missouri River on the north which will be bridged by a private toll structure to be built with R. F. C. funds.

Engineers' Licensing Act Approved in Ohio

Governor White of Ohio has signed a bill passed by both branches of the Ohio legislature to regulate the practice of engineering and surveying in the state, to become effective in September. The act sets up a registration board of five members to be named by the Governor. Present engineers and surveyors have eighteen months in which to register without examination by paying a fee of $15 for engineers and $10 for surveyors. After eighteen months, applicants for licenses must present evidence of graduation and satisfactory professional experience or take an examination, both written and oral. Evidence of extensive experience may take the place of an examination. Reciprocity with other states is provided.

Metropolitan Sewer District Planned for Lake Washington

The Lake Washington Metropolitan Sewerage Commission, Seattle, Wash., is preparing to make a survey of seven of Seattle's suburban districts in order to plan a metropolitan sewer system around Lake Washington.

R.F.C. Approves $10,305,200 Loans In Final Week

DURING the final week of its jurisdiction over self-liquidating loans, the Reconstruction Finance Corporation approved 29 applications for funds for self-paying projects totaling $10,305,200. At the close of business June 26 the R.F.C. turned over to the administrators of the public works program the responsibility for financing self-liquidating projects. Many deferred applications for funds running into hundreds of millions were handed over by the corporation. During the past year the R.F.C. has approved loans for construction projects totaling $217,565,363, ranging in size from $500 to $62,000,000. Actual advances on commitments reached a total of $26,567,050.

The largest single loan of the past week was granted to the Saratoga Springs Authority of New York State for the construction of additional facilities at the health resort to cost $3,200,000. Repayment will be made from fees charged at the springs and from sale of mineral waters bottled by the state. The city of Newark, N. J., will complete the rapid transit line now being constructed in the bed of the old Morris canal with an R.F.C. loan of $2,800,000. The railway will be owned by the city and will be leased to the Public Service Coordinated Transport Corp. for a fixed annual fee. The third large loan of the week was that of $1,100,000 granted to the Todd Shipyards Corp. of New York for the construction of a ship repair and drydock plant on the Houston, Tex., ship canal. New York City will have a planetarium similar to that of Chicago's as the result of a loan of $650,000 to the American Museum of Natural History Authority.

Numerous small loans

Other loans granted last week are as follows: Paducah, Ky., $50,000 for a factory to be built by the city and turned over to clothing manufacturers; Columbia, S. C., $82,000 for a municipal stadium and $81,000 for a new water tank; Padre Island Bridge Co., $250,000 for the construction of a toll bridge 11,300 ft. long from Port Isabel, Tex., to Padre Island; Heber, Calif., $15,000 for a water supply system to compete with a private company now serving the town; County Urban Water Co., Kansas City, $255,000 for a new water distribution system to serve several suburban districts north of Kansas City; Denver Produce Market Co., Denver, $213,200 for the construction of a market; Owosso, Mich., $75,000 for a water-softening plant; Elkhart, Tex., $15,000 for a new waterworks system; Burt-Washington Drainage District, Tekamah, Neb., $60,000 for the construction of settling basins; Neptune Utilities Co., Atlantic Beach, Fla., $7,500 for improvements to its water system; Wildwood, N. J., $325,000 for improvements to its water system; East Lyme Water Co., East Lyme, Conn., $100,000 for a complete new water system to serve communities on the Niantic River and Long Island Sound; Ford County Housing Association, Dodge City, Kans., $155,000 for the construction of 100 houses, each on a 2-acre tract; Eau Claire, S. C., $67,500 for waterworks improvements; Santaquin City Corp., Santaquin, Utah, $22,000 for the replacement of 5 miles of wood stave water pipe with cast iron pipe; Midway Waterworks Co., Midway, Utah, $6,000 for the replacement of sections of wood stave water pipe; Elk Rapids, Mich., $10,000 for a new elevated water tank; Honaker, Va., $25,000 for a complete new waterworks system.

Court Frees Three Contractors Indicted in San Gabriel Dam Case

Indicted secretly last February on charges of giving an $80,000 bribe to Sidney T. Graves, former supervisor of Los Angeles, Calif., county, three contractors, Alan MacDonald, Felix Kahn and Charles R. Ross were freed of the accusations June 16 by the county superior court. Failure of the district attorney to bring the defendants into court within sixty days after the date of their indictment was the basis for the dismissal of the charges. It was charged in the indictment that the three contractors gave Mr. Graves the bribe to influence his aid in effecting an $830,000 settlement with Los Angeles county for abandonment of the proposed $25,000,000 San Gabriel Canyon high dam. Mr. Graves was convicted of receiving a bribe and now is awaiting decision on his appeal.

SOCIETY CALENDAR

AMERICAN SOCIETY OF MUNICIPAL ENGINEERS, Milwaukee, Wis., Sept. 25-27.

NEW ENGLAND WATER WORKS ASSOCIATION, annual convention, Bridgeport, Conn., Sept. 19-22.

Contracts Awarded for Last of Major Aqueduct Tunnels

The award of contracts for an additional 11 miles of tunnels on the Colorado River aqueduct on June 16 by directors of the Metropolitan Water District of Southern California places the entire series of tunnels, aggregating 83 miles in length, under contract excepting the East Eagle Mountain tunnel, 1.79 miles long, bids for which were rejected on June 2. In the last award the Walsh Construction Co., of Davenport, Iowa, received contracts for the Colorado River tunnel, Copper Basin tunnel Nos. 1 and 2, and the Whipple Mountain tunnel, aggregating 9.5 miles, for $4,357,780. The West Construction Co., of Boston, is awarded the contract for the Whitewater tunnels Nos. 1 and 2, totaling 1.9 miles, for $1,051,838.

County Diversion of Gas Tax Held Illegal in Illinois

A permanent injunction prohibiting Illinois counties from diverting their share of the Illinois state gasoline tax to relief purposes has just been issued by Judge L. Stone, of the Sangamon County Circuit Court. Judge Stone holds that the Meentz law, under which such diversion has taken place, is unconstitutional. The action was brought by an organization of contractors to prevent use of gasoline tax funds for any other purpose than that of highway construction and maintenance. In recent months several counties of the state have issued bonds for unemployment relief to be retired from the county's share of one-third of the state gasoline tax.

Technical Group Reports on Los Angeles Earthquake Hazard

RECOGNITION of a continuing earthquake hazard and recommendation of a 10 per cent seismic factor in building construction are contained in the preliminary report of the Joint Technical Committee on Earthquake Protection, Los Angeles. The present report is the forerunner of a complete technical study resulting directly from the Long Beach disaster of Mar. 10. Headed by Robert A. Millikan, president of the California Institute of Technology, the joint committee includes representatives from the A. I. A., Am. Soc. C. E., Assoc. Petrol. Geol., Seis. Soc. Am. and the A. G. C., among others.

The committee attacked the subject of earthquake hazard and earthquake protection from a broad point of view and will continue for several months to investigate various factors in detail. The present summary statement is for the purpose of putting the general findings before the public and governing officials. A brief abstract of the conclusions follows:

The geological structure of southern California is characterized by numerous faults on which movement may occur at any time. Large areas of deep alluvium on the coastal plain tend to intensify earthquake shocks which, contrary to popular conception, are not restricted to the narrow zone along the fault. There is no doubt regarding the necessity of protection in this area against an earthquake of the intensity and duration of that which occurred in the San Francisco region in April, 1906.

In Long Beach and vicinity the lessons of San Francisco and Santa Barbara had been disregarded and almost no buildings in the region had been designed to resist earthquake forces. About 100 lives were lost by the collapse of walls, parapets and other falling débris, substantially all of which should and could have been prevented. Damage to schools was widespread and no one can question the imperative necessity of prompt and effective correction of the weakness prevalent in the school building.

In the design of buildings to resist an earthquake of the intensity and duration to be anticipated in this region, horizontal forces equal to one-tenth of the superincumbent weight above each level must be assumed as being applied in any direction, while more rigid standards have been adopted in regions of greater seismic hazard, it is believed that a momentary increase of one-third the unit stresses of materials is justified in this area.

The report recognizes the significance of the ratio between buildings to be built during the next decade and those older buildings which will not be affected by any new code provisions. It urges that insofar as the police power of the state permits it should be required that existing buildings be made earthquake resistant. Particularly, there should be no delay in making schools and other public buildings safe.

Personal Notes

PARK H. MARTIN, of Bellevue, has been appointed county maintenance engineer of Allegheny County, Pa., succeeding A. GRIFFITHS.

CLARENCE A. BINGHAM, for the past 18 years city manager of several cities, has become a member of the Municipal Management Research Co., of Boston and Chicago.

RUSSELL C. BOOTH and ROSS L. BRYANT of Los Angeles, have been appointed to the engineering staff of the Metropolitan Water District of Southern California. Mr. Booth, formerly a construction superintendent on the Madden Dam in the Canal Zone and on the Big Creek hydroelectric project of the Southern California Edison Co., will be in charge of District No. 1, Colorado River aqueduct line, covering about 20 miles of the project. Mr. Bryant, former resident engineer for the San Joaquin Light & Power Co., will be a general superintendent on the Coachella tunnels on work being done by the district by day labor.

Obituary

HENRY C. BUCKMEYER, 67 years of age, erection engineer for the Pedro Miguel and Miraflores locks in the Panama Canal, died June 15 at Los Angeles. Until his retirement a year ago he was an engineer for the Layne & Bowler Corporation.

FREDERICK D. USSHER, contractor of Buffalo, N. Y., died in that city June 21 at the age of 70. Mr. Ussher was a graduate of Phillips Exeter Academy, and specialized in bridge building. He built the cantilever bridge at Niagara Falls and a number of others in various parts of the country.

DAVID SLOAN, former chief engineer, Illinois Central R.R., died June 25 in Wilmette, Ill. He was born in Ireland 85 years ago and entered railroad service in Chicago in 1871, as chairman on the construction of a branch of the Lake Shore & Michigan Southern R.R. For many years he maintained a consulting office.

JOHN H. BRUMBAUGH, chief engineer, Western Actuarial Bureau, Chicago, and a national authority on fire prevention, died June 9 at the age of 54. Active in fire prevention work for 33 years he was connected with the Chicago Board of Underwriters from 1900 to 1916. For the next 13 years he was chief engineer of the Central Actuarial Bureau when it was consolidated with the Western.

FREDERICK WILCOCK, engineer in charge of Division for the Determination of Cost of Subway Work, and for many years a member of the Board of Transportation in New York City, died June 16, at New York at the age of 60 years. He was born in Lancashire, England. Mr. Wilcock graduated from Harvard in 1900 and became a member of the Public Service Commission No. 2 in the following year and served with that body until it became the Board of Transportation, of which he then became a member.

Engineering Contracts and Capital

HEAVY engineering construction contracts reported the past week total $22,882,000, a loss of 6.4 millions from the previous week's unusually high total, but well ahead of the average of the past eight weeks. Including a $7,000,000 contract for a chemical plant at Corpus Christi, Tex., private contracts reached a total of $12,494,000, the second highest weekly figure for this class of work since last July. Public works awards, with a low federal total of $777,000, amounted to $10,388,000, about the average of the past four weeks. Highway lettings amounted to $8,000,000, the highest weekly total since the withdrawal of federal aid early in March. Two states bought their year's supply of cement last week, Illinois purchasing 2,000,000 bbl. for $2,880,000, while Mississippi placed a cement order amounting to $2,540,000.

The trend of heavy private construction is most encouraging, showing the first tendency towards an upturn since late 1931. Private contracts this month have averaged 13.6 millions per week, the largest weekly average for this class of work since October, 1931.

New productive capital, mostly public bond issues, reported last week totals $4,948,000. Cumulative new capital for the year, including $8,814,000 advanced by the R.F.C. for self-liquidating loans, amounts to $132,457,000, about a third of the cumulative total to date of last year. In the final week of its jurisdiction the R.F.C. approved 29 self-liquidating loans totaling $10,305,000. Since its inception last year, the corporation has committed itself to loans aggregating $217,565,363, of which $26,567,050 has been advanced to finance construction project.

Contracts and Capital

CONSTRUCTION

(Thousands of Dollars)

	Weekly June 1932	Average Four Weeks	Week June 29 1933
Federal government	$6,384	$1,423	$777
State and municipal	12,002	11,049	9,611
Total public	$18,386	$12,472	$10,388
Total private	5,331	9,833	12,494
Week's total	$23,717	$22,305	$22,882
Cumulative to date:			
1932		$598,115	
1933		448,608	

NEW PRODUCTIVE CAPITAL

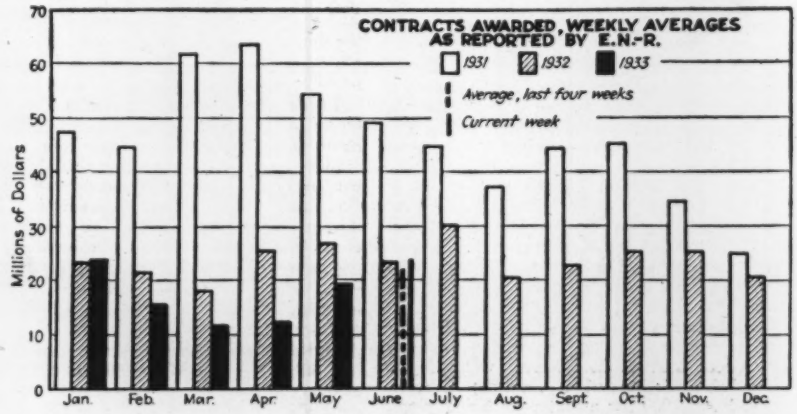
(Thousands of Dollars)

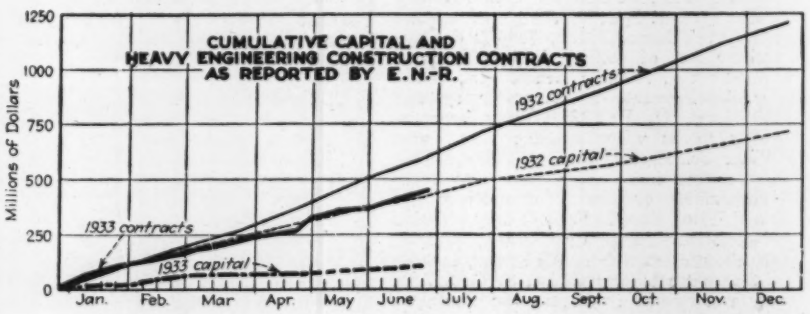
	Weekly June 1932	Average Four Weeks	Week June 24, 1933
New capital issues	$12,600	$7,651	$4,948
Cumulative to date:			
1932		$407,400	
1933		132,457	

R.F.C. self-liquidating loans:	
Approved current week	$10,305,200
Approved to date (including 1932)	217,565
Actual loans made (including 1932)	26,567

ENR Cost and Volume Index

E.N.-R. Cost		E.N.-R. Volume	
June, 1933	**163.41**	**May, 1933**	**103**
May, 1933	164.39	April, 1933	65
June, 1932	152.20	May, 1932	149
1932 (Average)	156.97	1932 (Average)	127
1931 (Average)	181.35	1931 (Average)	220
1930 (Average)	202.35	1930 (Average)	260
1913 Average	100		





Construction Equipment and Materials

Train-Operated Scoops

The Insley Manufacturing Co., Indianapolis, Ind., announce the Insley-Hercules scoops, designed to be operated in trains of three or four, depending on the power of the tractor drawing them and working conditions. These scoops are made in one and two-yard sizes.

The scoop itself consists of a bowl with rounded edges, suspended on springs. Incorporated as a part of the axle is an internal-expanding band clutch completely enclosed in a dirt-proof housing. This clutch is controlled by the operator by means of a lever and hand line. Engagement of the clutch lowers the scoop into digging position; its release allows the power of the springs to lift the bowl clear of the ground into traveling position. An operator's platform with safety rail is mounted on the first scoop. Dumping is done by repeating the engagement of the clutch, at the same time releasing a latch on the drawbar.

Insley-Hercules scoops controlled by lever and hand line.

Aluminum Trays and Rubber Tires In New Line of Wheelbarrows

Red Star Products, Bedford, Ohio, has with the cooperation of the Aluminum Company of America designed its entire line of wheelbarrows. Four models comprising 48 numbers will hereafter be available in the following combinations: Model A, standard chassis with aluminum tray and aluminum disk wheel; Model B, standard chassis, aluminum tray and balloon-tire wheel; Model C, all-aluminum barrow with aluminum disk wheel; Model D, all aluminum barrow with balloon-tire wheel. Trays will be available in sizes, capacities and gages ranging from 2 to 11 cu.ft., struck measure. All barrows have wood handles.

The 5-cu.ft. barrow, for instance, has a 60-in. chassis, an overall width of 24 in., and an overall height of 29½ in. With the balloon tire wheel the total weight is 45 lb., and with the aluminum disk wheel, 41 lb. In steel as formerly manufactured, same barrow weighed 85 lb.

Light-weight wheelbarrows by Red Star Products.

New Equipment in Brief

Power Shovel. The Northwest Engineering Co., Chicago, Ill., announces the Northwest Model 80 shovel having a capacity of 2 cu.yd. Boom and dipper sticks are of all-welded construction and the boom is slightly cambered. The new shovel is powered with a special 4-cylinder gasoline engine.

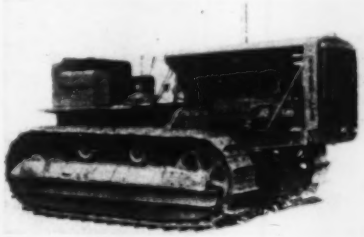
Trailer. The Fruehauf Trailer Co., Detroit, Mich., have announced an improvement in the design of their four wheel trailer. The improvement consists of the use of a self-lubricating bronze composition in the circle-steer mechanism. The new metal is known as "Oilite" metal and contains 35 per cent oil by volume.

Cement Lined Pipe. Steel pipe lined with a special cement which is highly insoluble in water is announced by the National Tube Co., Pittsburgh, Pa. The manufacturer states that the cement used has only about one-third the solubility of ordinary portland cement mixtures. Special methods of curing are used which result in a minimum of shrinkage during setting. The cement lining, designated Duroline, is a material of low lime and high silica content.

Steel Wire. Shipments of a new kind of galvanized wire, using a patented electric process, marketed under the trade name "Bethanized," were started this week from the Maryland plant of the Bethlehem Steel Co., Sparrows Point, Md. The wire does not supplant hot dipped galvanized wire, but is manufactured for special purposes, such as telephone lines, where the wire is submitted to unusual bending and twisting, and where high resistance to corrosion is a factor.

Large Diesel Tractor

The largest and most powerful tractor in the Caterpillar line, the Caterpillar Diesel 75, has just been announced by the Caterpillar Tractor Co. of Peoria, Ill. It is powered with a six-cylinder valve-in-head diesel engine developing 80 hp. at the drawbar and 93 hp. on the belt at 820 r.p.m. The engine has a bore and stroke of 5½x8 in. Starting is by means of a bendix driven by an auxiliary two-cylinder gasoline engine mounted on the left side of the block.



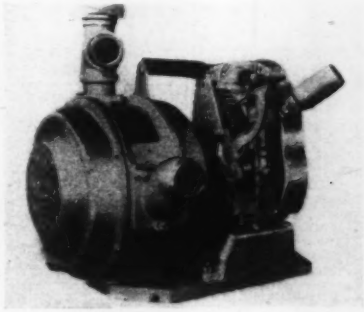
Caterpillar Diesel 75.

Eight speeds, six forward and two reverse, provide working speeds ranging from 1.7 to 5 miles per hour.

The machine weighs 30,550 lb. and has a ground contact of 3,515 sq. in.

Light-Weight Self-Priming Pump

Marlow Pumps, Ridgewood, N. J., has introduced a lightweight self-priming 2 in. centrifugal pump. The light weight is obtained by the use of aluminum alloy wherever practicable. The total weight of the unit is 110 lb. and it is so designed as to be picked up and carried like a suitcase. It is powered by a 4-cycle engine and has a capacity up to 80 gal. per minute.



New pump uses aluminum alloy to save weight.

Business Notes

H. W. Roos Co., Cincinnati, Ohio, announces that the decision handed down on October 16, 1931, by the Federal Court at Cincinnati, Ohio, holding that the company had infringed re-issue patent 16,736 owned by the M. & M. Wire Clamp Co. of Minneapolis, Minn., has been reversed by the U. S. Court of Appeals on April 11, 1933. The present decree holds that the patent involved is invalid.

Brown-Bevis Co., 4900 Sante Fe Ave., Los Angeles, Calif., equipment distributors, which has been in receivership for nearly two years, was sold on May 10 to a new organization consisting of Walter Parsons, formerly general manager of the company; J. A. Beynon, formerly of the Kimball Krogh Pump Co.; C. M. Weinberg, of the California Equipment Co.; and B. G. Rhodes. The business will be continued at the present location.

Current Construction Unit Prices

West Eagle Mountain, Hayfield and Mecca Pass Tunnels—Colorado Aqueduct

CONTRACTS WERE AWARDED June 2, 1933, by the Metropolitan Water District of Southern California for the construction of six tunnels totaling 8.93 miles on the Colorado River aqueduct, under six schedules. The six schedules are as follows: Schedule 3—east portion, West Eagle Mountain tunnel, 2.97 miles; Schedule 5—west portion West Eagle Mountain tunnel, 2.01 miles; Schedule 7—east portion Hayfield No. 1 tunnel, .91 miles; Schedule 9—west portion Hayfield No. 1 tunnel, .91 miles; Schedule 11—Hayfield No. 2 tunnel, 1.02 miles; Schedule 13—Mecca Pass tunnels No. 1, 2 and 3, total length 1.11 miles. Bids on Schedule 1, East Eagle Mountain tunnel, were rejected and will be readvertised. All schedules were for horseshoe shaped sections 16 ft. in diameter. Earlier alternate proposals for 12 ft. 4 in. sections were cancelled.

The District will furnish all cement, steel supports and reinforcing steel. The contractor will furnish all timbering. Aggregates are secured from local deposits, with a bid price for haulage over 2 miles. Prevailing wages must be paid. Following are given the complete unit prices of the three low bidders on each schedule, with contract prices noted. F. E. Weymouth is chief engineer and general manager of the District.

SCHEDULE III — EAST PORTION WEST EAGLE MOUNTAIN TUNNEL
Length 2.97 miles

Three Low Bidders	Total Bid
A — Broderick & Gordon, Denver (Contract)	$1,435,614
B — L. E. Dixon & Bent Bros., Los Angeles	1,484,734
C — John Griffiths & Son Co., Chicago	1,491,140

Item	Quan.	Unit Prices A	B	C
Excavation in tunnel, cu.yd	170,500	$5.70	$6.40	$6.47
Excavation, tunnel enlargement, cu.yd.	50	12.50	10.00	7.00
Concrete tunnel lining, cu.yd	44,300	5.78	5.00	5.00
Permanent timbering, M f.b.m	180	60.00	90.00	50.00
Erecting steel supports, tons	20	40.00	30.00	40.00
Gunite coating in tunnel, cu.yd	90	30.00	20.00	20.00
Connections for grouting, each	40	8.00	6.00	5.00
Mix and place grout, cu.yd	60	30.00	30.00	10.00
Placing reinforcing steel, lb	60,000	.02	.015	.02
Overhaul aggregates, cu.yd.mi	15,000	.05	.06	.12
Hauling steel, ton mi	2,100	.15	.14	.05
Hauling cement, ton mi	480,000	.08	.06	.05

SCHEDULE V — WEST PORTION WEST EAGLE MOUNTAIN TUNNEL
Length 2.01 miles

Three Low Bidders	Total Bid
A — L. E. Dixon Co. & Bent Bros., Los Ang. (Contract)	$1,025,898
B — Silas Mason Co., New York	1,045,450
C — Broderick & Gordon, Denver	1,150,130

Item	Quan.	Unit Prices A	B	C
Excavation in approach cut, cu.yd	5,000	$2.50	$1.60	$2.25
Excavation in tunnel cu.yd	115,800	7.14	7.00	7.86
Excavation, tunnel enlargement, cu.yd	40	10.00	8.00	12.50
Concrete in approach, cu.yd	560	9.00	9.00	13.50
Concrete lining in tunnel, cu.yd	30,100	5.00	6.50	6.22
Permanent timbering, M f.b.m	115	90.00	70.00	60.00
Erecting steel supports, tons	20	30.00	40.00	40.00
Gunite coating in tunnel, cu.yd	60	20.00	20.00	30.00
Connections for grouting, each	30	6.00	5.00	8.00
Mix and place grout, cu.yd	40	30.00	15.00	30.00
Place reinforcing steel, lb	40,000	.015	.02	.02
Overhaul aggregates, cu.yd.mi	10,000	.06	.10	.05
Hauling steel, ton mi	1,400	.14	.10	.15
Hauling cement, ton mi	262,000	.06	.05	.08

SCHEDULE VII—EAST PORTION HAYFIELD NO. 1 TUNNEL
Length .91 Miles

Three Low Bidders	Total Bid
A — Hunkin-Conkey Const. Co., Cleveland (Contract)	$403,276
B — L. E. Dixon Co. & Bent Bros., Los Angeles	414,093
C — Hamilton & Gleason, Lakeview, Cal	431,234

Item	Quan.	Unit Prices A	B	C
Excavation in approach cut, cu.yd	3,300	$2.00	$2.50	$2.50
Excavation in tunnel, cu.yd	52,300	5.95	6.25	6.25
Excavation, tunnel enlargement, cu.yd	40	10.00	10.00	10.00
Concrete lining in tunnel, cu.yd	13,600	5.60	5.00	6.25
Permanent timbering, M f.b.m	22	60.00	90.00	45.00
Erecting steel supports, tons	5	50.00	30.00	40.00
Gunite coating in tunnel, cu.yd	35	18.00	20.00	30.00
Connections for grouting, each	20	5.00	6.00	6.00
Mix and place grout, cu.yd	25	20.00	30.00	30.00
Placing reinforcing steel, lb	25,000	.02	.015	.015
Overhaul aggregates, cu.yd.mi	5,000	.10	.06	.20
Hauling steel, ton mi	520	.06	.14	.20
Hauling cement, ton mi	102,000	.05	.06	.06

SCHEDULE IX — WEST PORTION HAYFIELD NO. 1 TUNNEL
Length .91 Miles

Three Low Bidders	Total Bid
A — Hunkin-Conkey Const. Co., Cleveland (Contract)	$411,676
B — J. N. Gordon & Floyd Shofner, Los Angeles	447,094
C — Geo. R. Cooke Co., Detroit	453,364

Item	Quan.	Unit Prices A	B	C
Excavation, approach cut, cy.yd	8,200	$1.00	$2.00	$1.85
Excavation in tunnel, cu.yd	52,300	5.95	6.50	6.50
Excavation, tunnel enlargement, cu.yd	40	10.00	10.00	10.00
Concrete in approach, cu.yd	800	8.50	6.50	8.00
Concrete lining in tunnel, cu.yd	13,600	5.60	5.50	6.00
Permanent timbering, M f.b.m	22	60.00	55.00	70.00
Erecting steel supports, tons	5	50.00	30.00	40.00
Gunite coating in tunnel, cu.yd	35	18.00	28.00	30.00
Connections for grouting, each	20	5.00	9.00	5.00
Mix and place grout, cu.yd	25	20.00	24.00	20.00
Placing reinforcing steel, lb	25,000	.02	.02	.02
Overhaul aggregates, cu.yd.mi	5,000	.10	.10	.15
Hauling steel, ton mi	520	.06	.20	.20
Hauling cement, ton mi	102,000	.05	.06	.05

SCHEDULE XI — HAYFIELD NO. 2 TUNNEL
Length 1.02 Miles

Three Low Bidders	Total Bid
A — J. L. Gordon & Floyd Shofner, Los Angeles (Contract)	$471,889
B — Morrison-Knudsen Co., Los Angeles	495,351
C — R. S. Morrow & Son and Shirley Const. Co., Omaha	507,520

Item	Quan.	Unit Prices A	B	C
Excavation, approach cut, cu.yd	11,300	$2.00	$1.00	$1.00
Excavation in tunnel, cu.yd	58,000	6.00	6.15	6.39
Excavation, tunnel enlargement, cu.yd	40	10.00	10.00	9.00
Concrete in approach, cu.yd	940	6.50	8.00	11.00
Concrete lining in tunnel, cu.yd	15,100	5.50	7.00	6.84
Permanent timbering, M f.b.m	33	55.00	80.00	80.00
Erecting steel supports, tons	10	30.00	30.00	65.00
Gunite coating in tunnel, cu.yd	35	28.00	25.00	20.00
Connections for grouting, each	20	9.00	5.00	10.00
Mix and place grout, cu.yd	25	24.00	30.00	25.00
Placing reinforcing steel, lb	25,000	.02	.015	.02
Overhaul aggregates, cu.yd.mi	5,000	.10	.15	.12
Hauling steel, ton mi	670	.20	.15	.15
Hauling cement, ton mi	112,000	.06	.07	.05

SCHEDULE XIII — MECCA PASS TUNNELS NO. 1, 2 AND 3
Total Length, 1.11 Miles

Three Low Bidders	Total Bid
A — J. N. Gordon & Floyd Shofner, Los Angeles	$554,890
B — Silas Mason Co., New York	557,820
C — Morrison-Knudsen Co., Los Angeles (Contract)	575,685

Note: Bidder A wanted one Schedule only, awarded Schedule XI. Bidder B wanted all Schedules or none.

Item	Quan.	Unit Prices A	B	C
Excavation, approach cut, cu.yd	31,300	$1.30	$0.50	$1.00
Excavation in tunnel, cu.yd	65,300	5.85	6.20	5.85
Excavation, tunnel enlargement, cu.yd	40	10.00	6.50	10.00
Concrete in approach, cu.yd	2,550	6.50	6.50	8.00
Concrete lining in tunnel, cu.yd	17,000	5.50	6.00	6.75
Permanent timbering, M f.b.m	200	55.00	50.00	80.00
Erecting steel supports, tons	20	30.00	35.00	30.00
Gunite coating in tunnel, cu.yd	100	28.00	20.00	25.00
Connections for grouting, each	20	9.00	5.00	5.00
Mix and place grout, cu.yd	25	24.00	15.00	30.00
Placing reinforcing steel, lb	100,000	.02	.015	.015
Overhaul aggregates, cu.yd.mi	5,000	.10	.10	.15
Hauling steel, ton mi	1,000	.20	.10	.15
Hauling cement, ton mi	64,000	.06	.05	.07

OVER 1/3 of those contractors that have bouqht and used a NORTHWEST shovel have purchased one or more additional NORTHWEST machines . . . . . .

A repeat order is the result of satisfactory service . . .

NORTHWEST SHOVEL—AMERICA'S LEADING ROAD BUILDER

Pedal Control of the dipper "splits the inche
In grading and leaves a flat level floor without han
trimming.

Wide level floor radius gives a maximum clean-up that
reduces handwork and relocation of the machine.

The Close-Quarter Independent Crowd provides long
reach that often keeps the trucks off the subgrade.

Positive traction even while turning reduces the dam-
age to the subgrade and eliminates much hand
trimming.

The Variable Speed Motor, Accelerator Controlled,
brings any speed to every operation at a touch of a
lever — faster digging, faster swing, faster travel and
faster return of the dipper to the cut.

You need these features to beat your competition.

NORTHWEST ENGINEERING CO.
1727 Steger Bldg., 28 E. Jackson Blvd., Chicago, Ill., U. S. A.

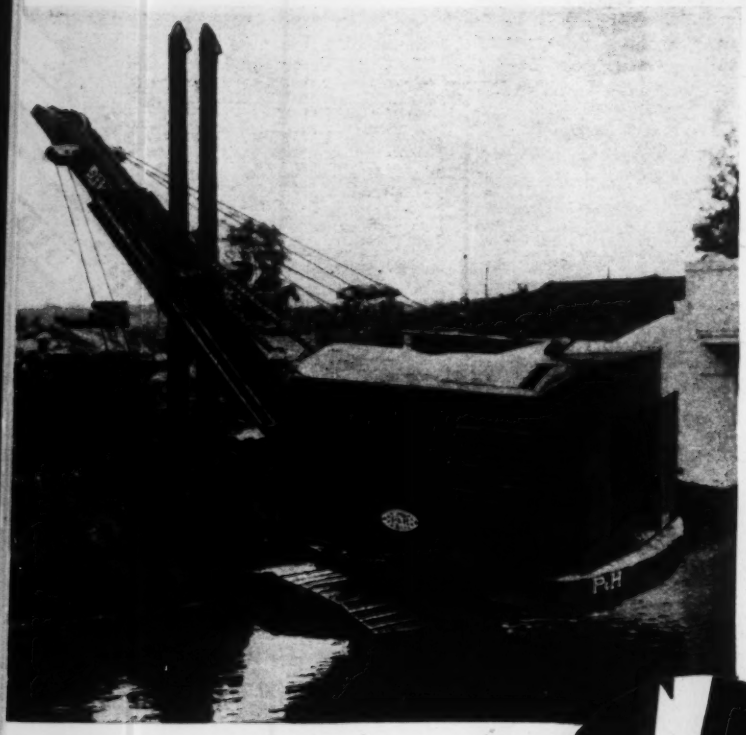
ENRC-29Gray

NORTHWEST

YOU CAN'T DODGE THIS:

the faster you move dirt the lower your costs—

YOU may have a cost system as fancy as an auditor's dream . . . or you may keep books on the back of an old envelope . . . but either way, you can't dodge this fact: a bigger day's work from your shovel means a lower dirt-moving cost. So if you're looking for low costs, high production, and freedom from breakdowns, come to P&H. Only P&H offers you such a combination of high speed, great power, and rugged strength. Only P&H gives you the excess production possible with Split Second Control.



Split Second Control

Six outstanding improvements on the new P&H machines speed up operation, cut down waste time, and reduce maintenance.

- Sure Feel Power Clutch
- Full Vision Cab
- Power Dipper Trip
- High-Production Main Clutches
- Rapid Reversing Crowd Planetary
- Super-Smooth Swing Clutch

HARNISCHFEGER CORPORATION
Established 1884
4404 W. National Avenue
Milwaukee, Wis.

Warehouses and Service Stations:
HOBOKEN MEMPHIS JACKSONVILLE
SEATTLE DALLAS LOS ANGELES
SAN FRANCISCO

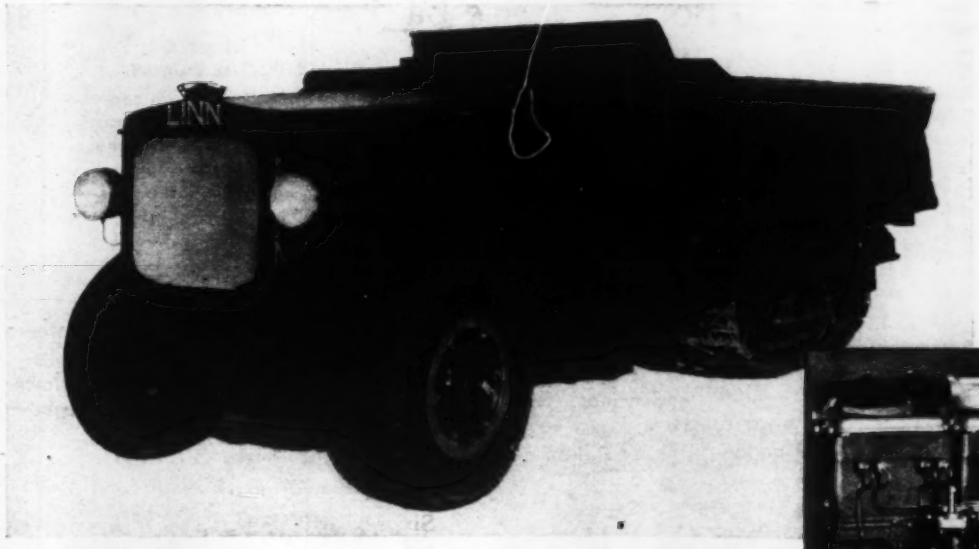
There's a P & H branch office in your territory—write or phone for further information.

split second CONTROL

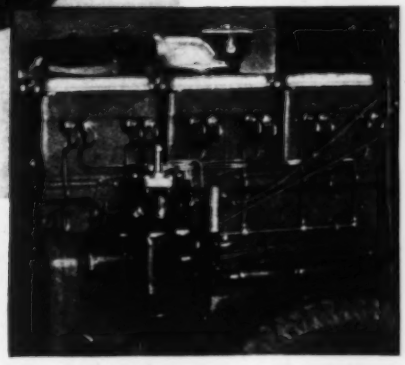
P&H

FOR A BIGGER DAY'S WORK

Again
LINN LEADS THE WAY
to *lower haulage costs!*



The new LINN, equipped with this dependable and economical high-torque LINN-Cummins Diesel engine, which is sweeping aside all records for low-cost haulage. No auxiliary power plant necessary for starting—no special equipment used.



Furnished with either gasoline or Diesel motors

THE facts now are available! Figures furnished by leading contractors giving actual operating costs of the Diesel-equipped LINN. They show yardage costs far lower than have ever before been achieved with other types of equipment. They prove the LINN Diesel first in performance—first in economy—first in dependability. Every dirt moving contractor, every coal stripper, every quarry owner, every logger, should obtain these facts. They can be had from any LINN representative, or by writing direct to Morris. Just ask for complete data on the LINN Diesel-equipped.

LINN TRACTORS

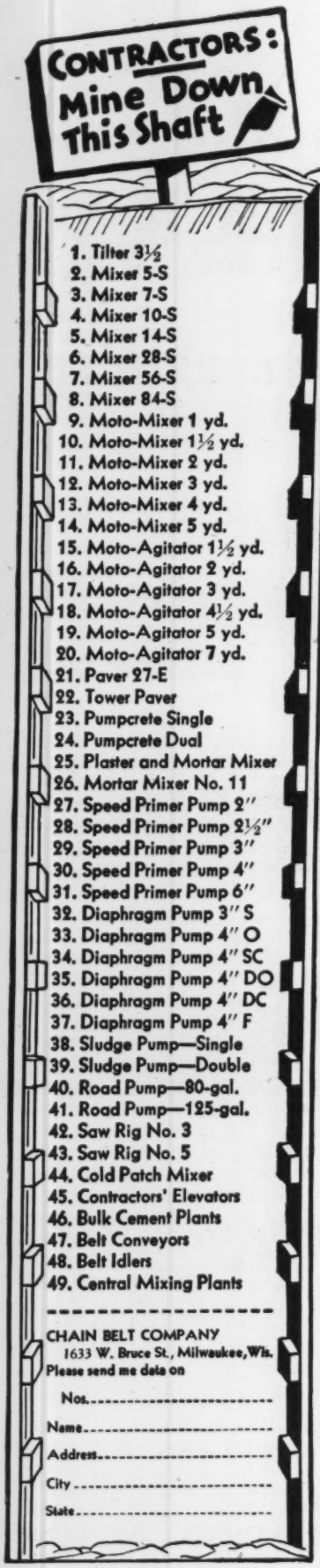
LINN PRODUCTS ARE PATENTED

THE LINN MANUFACTURING CORPORATION

MORRIS, NEW YORK

Represented in
Allentown, Pa. Baltimore, Md Chicago, Ill. Denver, Col. Los Angeles, Cal. Louisville, Ky. Nashville, Tenn. New Haven, Conn. New York, N. Y. Omaha, Nebr. Pittsburgh, Pa. Portland, Ore. Roanoke, Virginia Salt Lake City, Utah Sioux Falls, S. D. Skowhegan, Maine Spokane, Wash. St. Louis, Mo. St. Paul, Minn. Youngstown, Ohio

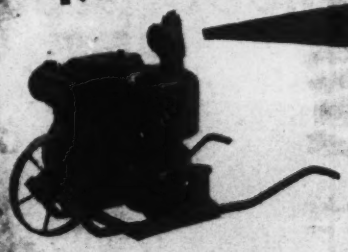
Canadian Linn Distributors: Mussens Limited, Montreal



You're on the Gold Standard for Machinery with the REX '49ers

NUGGETS NO-27-28-29-30-31 REX SPEED PRIME PUMPS

2½"-3"-4"-6"



SELF-PRIMING CENTRIFUGAL PUMPS

The Babies that Revolutionized the small pumping field. With their positive prime, and big capacity, these pumps have been outstanding in the contracting field since the first one was built. When the water gets dirty, and full of gravel—and the line leaking air—these Rex Pumps keep pumping water when others stop.

No question about that—the contractor with Rex Equipment is on a basis where he can command more currency—more profit for himself from the job.

The Rex '49ers are the 49 complete and distinct machines that spell lower cost—better work—more profit—the Rex standard of value never changes—it's always there.

And the prices are still on a Gold Standard Basis.

NUGGET NO-4

THE REX 10-S—Full 2-bag capacity, the Rex Water Control, Rex Shimmy Skip—7 second charge—7 second discharge—and quality in the Rex 10-S—the Bridge Builder's Special.

NUGGET NO-44

COLD PATCH MIXER—Handles all mixes—20 second mix on emulsified asphalt—45 seconds on cut back—with positive and complete discharge and without balling up.

See the Rex '49ers at your nearest REX Distributor's or write

CHAIN BELT COMPANY

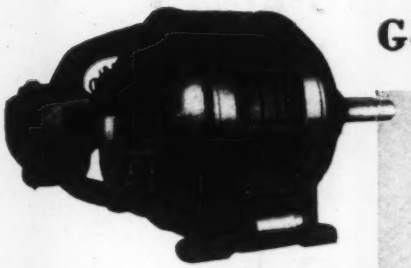
1615 WEST BRUCE STREET, MILWAUKEE, WISCONSIN

REX **CONSTRUCTION EQUIPMENT**

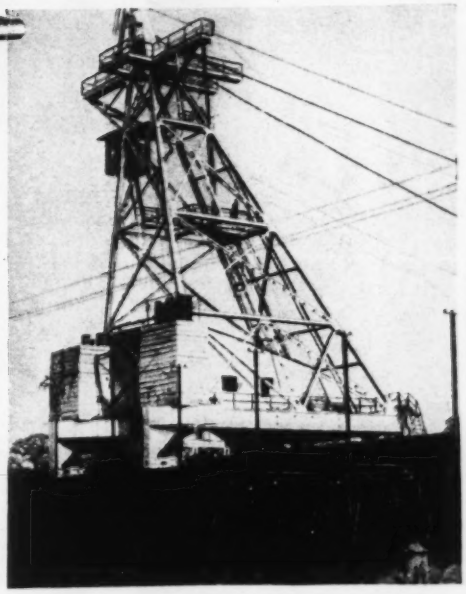
THE MOST COMPLETE LINE BUILT

Reasons Why

it will pay you to motorize your cableways with G-E MOTORS and CONTROL



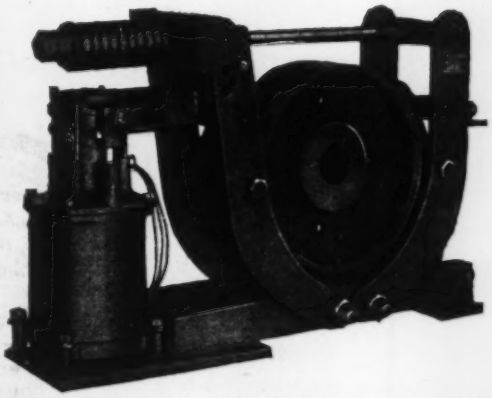
G-E wound-rotor induction motor for cableway service



This giant Lidgerwood cableway is helping to cut concreting costs in the construction of Madden Dam. G-E engineers cooperated with Lidgerwood in the selection of the RIGHT MOTOR and the RIGHT CONTROL for this important cableway

1. **General Electric has the RIGHT MOTOR for the job, and the RIGHT CONTROL for the motor—a combination that assures efficiency and dependability.**
2. **General Electric engineering aid—trained specialists—is readily available.**
3. **General Electric offers prompt manufacturing and shipping service.**
4. **General Electric maintains a nation-wide chain of service shops, ready to work with you on problems of installation and maintenance.**

Why not call in a G-E engineer before starting the next job? His skill and experience are not limited to the solution of cableway electrical problems; he will gladly advise on all matters of electric equipment — motors, controllers, transformers, wire and cable, etc.—for any project. Address the G-E office nearest you, or General Electric Company, Schenectady, New York.



Where high inertia is involved—as on the movable towers of the cableway at Madden Dam—G-E Thrustor brakes provide smooth, gradually applied retarding torque, and assure maximum safety

200-710

GENERAL ELECTRIC

WANTED—

. . . for taking money out of taxpayers' pockets

The taxpayer has never seen this man—but has been his victim.

His name is "HI" DRIVING COST. He lives on the road that is *less-than-concrete.* For every mile driven on such a road, he exacts his sly tribute. He makes people buy more tires, more gasoline. He runs up repair bills.

High Driving Cost makes "cheap" roads dear at any price. That's proved by impartial surveys of road costs. These surveys show that with even moderate traffic—the cost of transportation—road cost plus driving cost—is less over a concrete road than any other kind—even including a dirt road.

Taxpayers today want MOST for their taxes and they want LESS taxes! It is the clear duty and responsibility of the highway official to give them the roads they like best—concrete roads—and save them money at the same time! Write for "The Economics of Highway Construction." It's well worth having!

PORTLAND CEMENT ASSOCIATION
33 West Grand Avenue, Chicago

CONCRETE
FOR PERMANENCE AND ECONOMY

Do You Know . . .

That it costs less to run your car on concrete than on any other type of road?

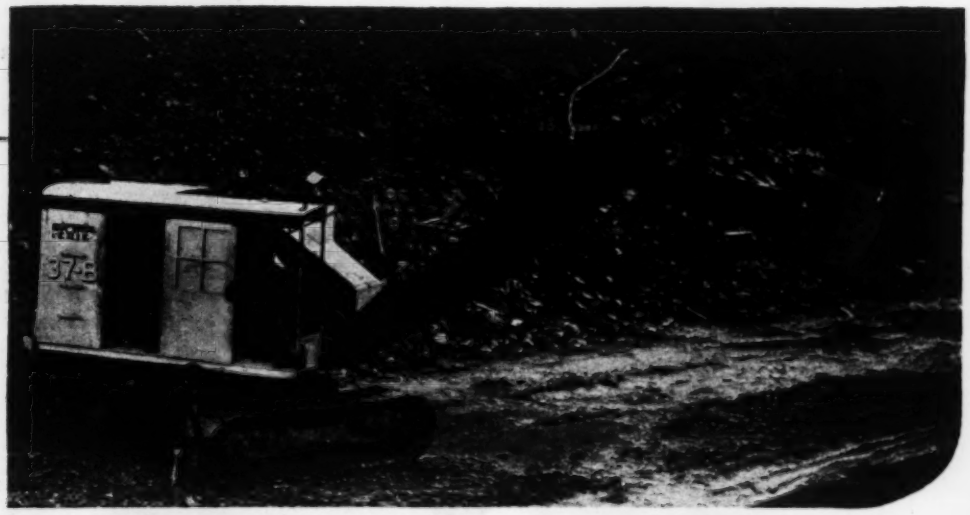
It Costs, on the Average:

3/4¢ — 3/4¢ more per mile to drive on bituminous macadam than on concrete

1 1/4¢ — 1 1/4¢ more per mile to drive on gravel than on concrete

2¢ — 2¢ more per mile to drive on an earth road than on concrete

Get all the facts before you make any decision on roads. They're contained in "The Economics of Highway Construction." It's yours for the asking!



THE WORLD'S LARGEST AND OLDEST MANUFACTURER OF EXCAVATING MACHINERY

RIGHT *where you want it!*

SOME machines have *speed*, others have *accuracy of control*, some have *both* . . . but not simultaneously. To make profits, you need a machine that gives you both speed and accuracy at the same time. Quick acceleration; smooth, sure braking action; a crowd that keeps the grade right where you want it; control levers conveniently arranged and easily handled; complete visibility from operator's station . . . these are things you would like to write into the specifications of your excavating equipment.

All these things have been built into the new line of Bucyrus-Eries for you . . . combined with the outstanding group of other qualifications that result in Balanced Value. Bucyrus-Erie speed and accurate control give you the big output and economy in clean-up which are so vitally important in making profits at present day prices.

BUCYRUS-ERIE COMPANY, So. Milwaukee, Wis.

All Sizes—
½ yd. to 18 yds.
Shovels : Draglines
Dragshovels : Cranes
Clamshells : Dredges
Tower Excavators
Tunnel Shovels
"Loadmaster" Cranes
Bucyrus-Monighan
Walking Draglines.
Gasoline : Diesel
Electric : Gas+Air
Steam
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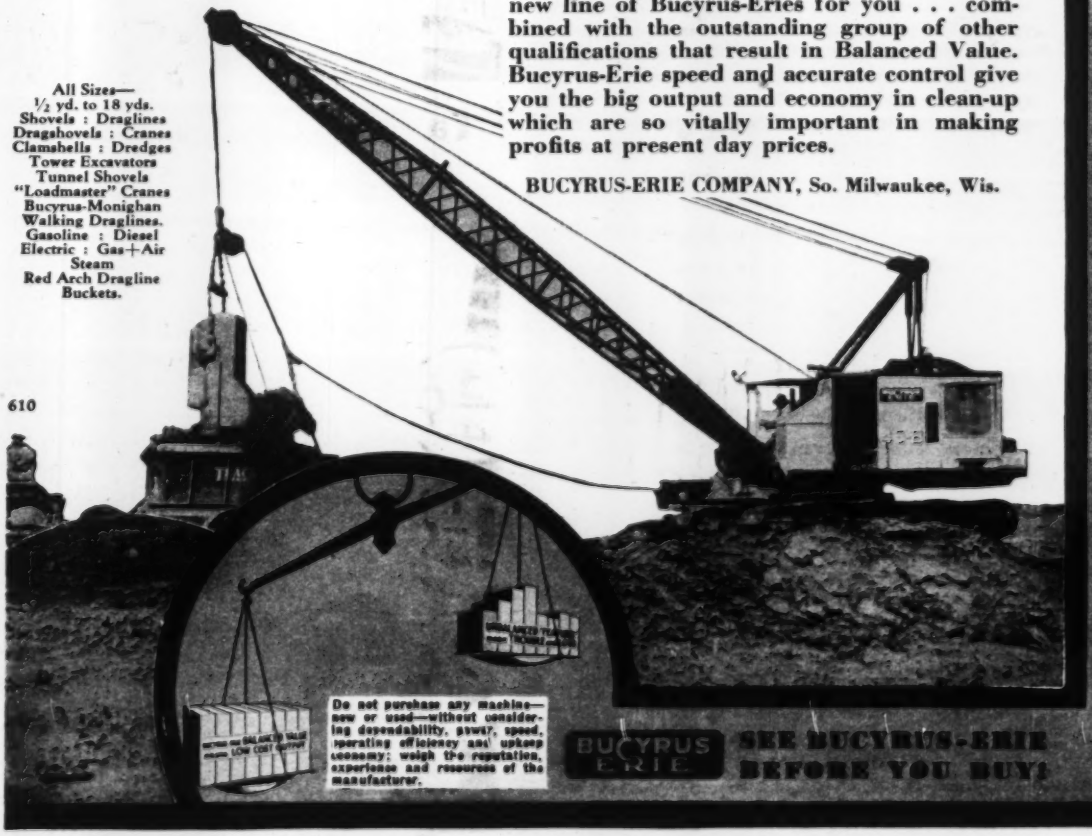
Buckets.

610



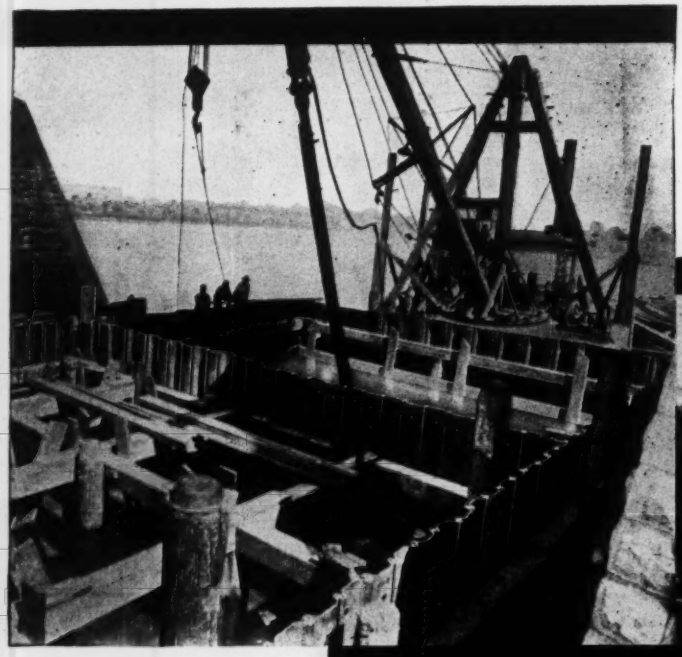
Do not purchase any machine—new or used—without considering dependability, power, speed, operating efficiency and upkeep economy; weigh the reputation, experience and resources of the manufacturer.

BUCYRUS ERIE

SEE BUCYRUS-ERIE BEFORE YOU BUY!

BALANCED VALUE CUTS COSTS

INLAND Steel Sheet Piling for Cofferdams



Cofferdam for Illinois Central Railroad bridge pier at LaSalle, Ill. Inland Sheet Piling Section IA 15-30 used. Contractors: Bates & Rogers Construction Co.

One of two cofferdams for the South Halsted Street bridge, Chicago. Inland Section ID 16-25 used. Piers reinforced with Inland bars. Fitzsimons & Connell Dredge & Dock Co. contractors.

TYPICAL of numerous cofferdams constructed of Inland Steel Sheet Piling are the two pictured above. For temporary service (as well as permanent) the Inland sections have proved their strength, their adaptability to adverse conditions. They have proved their merit quickly —shown by their use by leading contractors in all sections of the country.

Inland will welcome the opportunity of rendering engineering cooperation on your sheet piling problems, of quoting on your requirements. INLAND STEEL COMPANY, 38 So. Dearborn St., Chicago, Ill.

INLAND STEEL

ABLE SERVANT OF THE CENTRAL WEST

Sheets · Strip · Plates · Rails · Track Accessories
Bands · Structurals · Piling · Bars · Rivets · Billets

not all Crawler tractors are CLETRACS

. . those are which work where others fail

thus setting higher standards . .

ON the San Diego Disposal Dump a Cletrac 15 unloads and distributes more than 80 tons per day of city garbage and refuse. No other tractor equipment has ever handled this job satisfactorily.* • *You will not be asked to buy.* • If a careful, point-by-point comparison or demonstration fails to convince you of the inherent superiority of Cletracs—their ability to do more work at lower costs for operation and maintenance under even the most severe conditions—you will not be asked to buy. • We make crawler tractors exclusively—Model 80, the world's most powerful automotive unit, and models with horsepower rating 55-35-25-20.

THE CLEVELAND TRACTOR COMPANY • Cleveland, Ohio, U.S.A.

*Details on request.

RE-EMPLOYMENT

Under the Industrial Recovery Act

To put MEN to work and to get the work under way quickly . . . these are the two purposes the National Government is most concerned about in the giant Public Works bill. However, the Federal Government expects improvements to be of lasting value. Here is how highway work with Tarmac serves these purposes:

1. Construction with Tarmac requires a minimum of time for planning.
2. It can be done with local unskilled labor.
3. It can go into operation quickly.
4. It can be done with local aggregates, and this means local secondary employment *(quarries, trucking, etc.)*
5. The low cost of the materials leaves the maximum amount for labor.
6. Tarmac gives the community a lasting improvement.

In addition to this, Tarmac gives you these advantages:

7. Better combined penetration and binding than in other bituminous materials.
8. Lower annual cost in the long run.
9. Permanent skid-resistance with a smooth-riding surface.
10. Minimum maintenance costs.

KOPPERS PRODUCTS COMPANY, PITTSBURGH, PA.

KOPPERS **Tarmac**

with its Infaration Qualities

. . . assures you best Results

CONSTRUCTION REPORTS

WATERWORKS

PROPOSED WORK

Ala., Gordo—Town will make application to Reconstruction Finance Corp. for loan to construct municipal water system.

Ala., Grove Hill—Town plans application to Reconstruction Finance Corp. for loan to construct municipal water system.

Ark., Des Arc—City will make application soon to Reconstruction Finance Corp. for loan to construct municipal waterworks and distribution system, also sewerage systems in various streets. $75,000 to $80,000. J. H. Rice, 902 Marshall St., Little Rock, engr. Noted June 1.

Ark., Portland—City preliminary plans waterworks and distribution system. Plans application to Reconstruction Finance Corp. for loan. H. R. Carter, Natl. Standard Bldg., Little Rock, engr.

Calif., El Centro—Imperial Inter-Cities Water Dist., applied to Reconstruction Finance Corp. for loan of $986,149 to develop water supply system, from wells and construct gravity supply line to serve cities of Calexico, Heber, El Centro, Imperial, Brawley and Mexicali. Plans have been prepary, engr., 732 North Heliotrope Dr., Los Angeles. Water to be carried in 55 mi. of covered conduit to cities and redistributed through their own systems. Work involves 16,543 T. cement, 77,343 T. gunite mixture, 5 deep well turbine pumps (310 ft. depth 6 large self-registering meters, etc.

Calif., North Sacramento—City plans municipal water distributing system. To exceed $25,000. Water to be purchased from city of Sacramento.

Calif., Sonoma—H. W. Gottenberg, city clk., returned bids un-opened June 7, for construction of reservoir and water system, the local water company agreeing to sell its system for $24,000. System will be transferred to City in August at which time new bids will be asked to construct reservoir and pipe lines. Noted June 1.

Conn., East Lyme—East Lyme Water Co. plans water system extensions at Crescent Beach, Niantic, Pine Groves and Saunders Point and plant to consist of wells, pumping station, 6 and 8 in. water pipe, also 800,000 gal. standpipe. $100,000 loan approved by Reconstruction Finance Corp.

Ind., Bedford—City W. H. Murray, mayor making plans waterworks. $11,200. C. Brossman, 1009 Chamber of Commerce Bldg., Indianapolis, engr. Noted May 18.

Ia., Cedar Rapids—City Council and W. H. Stepanek, mayor, plan watermain extensions. $40,000. Project to be financed through funds obtained from National Industrial Recovery Bill.

Mich., Beulah—Village plans prepared waterworks, incl. buildings, elevated storage tank, c.i. distribution lines, hydrants, specials, motor driven pumping equipment and accessories. $28,500. Application to be filed with Reconstruction Finance Corp. for loan. Francis Eng. Co., 204 Eddy Bldg., Saginaw, engrs. Noted Feb. 16.

Mich., Birmingham—City Committee on Public Works to have plans completed and make application to Reconstruction Finance Corp. for loan to finance construction of water softening plant. $155,000. Engineer not appointed.

Mich., Elberta—Village plans prepared waterworks structures, wells, equipment, incl. 60,000 gal. concrete storage tank, 13,110 ft. 4- to 8-in. c.i. mains, 19 hydrants, valves, specials, etc. $26,382; also sewerage system and treatment works, 8,633 ft. 8 in. and 4,796 ft. 10 in. sewer crock and 1,275 ft. 12 in. c.i. pipe, septic tank and sludge drying bed, outfall sewer to Belsie River. $18,199. Plans application to Reconstruction Finance Corp. for loan. Francis Eng. Co., 204 Eddy Bldg., Saginaw, engrs. Noted May 11.

Mich., Sheboygan—City plans prepared for waterworks improvements and additions to include 2 pumps with combined capacity of 1250 g.p.m., one 450 gal. deep well turbine, one 800 gal. turbine for well No. 3; direct connection to storage tank; structures for wells, standby unit; piping, valves and specials; also for generating plant with diesel engine, generators and exciters, street lights and distribution system; lights and current regulators. Total est. of lighting plant and equipment $22,700. Francis Eng. Co., 204 Eddy Bldg., Saginaw, engrs. F. Malenfant, city clk.

N. J., Martinsville—North Jersey Dist. Water Supply Comn., 24 Commerce St., Newark, plans 45 m.g. storage reservoir between 1st and 2nd Watchung Mountains. Owner will finance if possible through federal aid bill. **Maturity indefinite.** Private plans.

O., Cleveland—Village of Pepper Pike plans application to Government for funds to construct watermain in Brainard and North Woodland Roads, at Pepper Pike, near here. $49,500. F. A. Pease Eng. Co., Terminal Tower, Cleveland-engrs.

O., Grafton—Village will make application to U. S. Govt. for funds to construct water softener and 75,000 gal. steel plate storage tank. $75,000. R. F. MacDowell, Chester Twelfth Bldg., Cleveland, engr. Noted June 23, 1932.

†Okla., Fort Sill—Con. Q.M., rejected bids May 11. 4,000 lin.ft. 12 in. c.i. watermains. Noted May 4.

Okla., Muskogee—City made plans watermain extensions. $30,000. Application made to Reconstruction Finance Corp. for loan. T. P. Clouts, city engr.

Pa., Monaca—Boro plans improving and extending waterworks system to Monaca Heights and Colony Dists., involving installing 8 new driven wells, small pumping station, 150,000 gal. standpipe, 3.2 mi. c.i. distribution mains, 5,600 ft. sewer laterals. Reconstruction Finance Corp. granted $40,000 loan. G. F. Wilson, borough clk.

S. D., Sioux Falls—City, W. C. Leyse, supt., making plans sinking new well, purchasing and installing equipment. R. E. Bragstad, city engr.

Tex., Austin—City, c/o J. G. Morgan, mgr., contemplates under Federal P. Wks. programme, raw water pump house and pump, $60,000; installing screen house and intake tunnel for raw water at plant $45,000; new high service pump at water plant, $15,000; constructing 6 m.g. settling basin as addition to present settling facilities, enlarging head-house and installing lime, unloading and feeding equipment at filter plant, $100,000; spray pond, $75,000; install 7,500 kw. turbo-generator and 10,000 sq.ft. surface condenser and auxiliaries, $275,000; repairs to power plant boiler settings, $15,000. Total $585,000.

Tex., San Angelo—City, c/o E. E. Lowrie, mgr., plans municipal water and light plant.

Utah, Antimony—City plans water system. $15,000. Reconstruction Finance Corp. loan requested.

Va., Mineral — Plans municipal water system, incl. digging one or more deep wells, constructing 60,00 gal. tank. $25,000 Reconstruction Finance Corp. loan approved.

BIDS ASKED

Calif., San Francisco—July 7, by F. Taylor, secy. P. Utilities Comn., City Hall, constructing Alameda Creek Siphon and Tesla Portal in connection with Hetch Hetchy Aqueduct, alternate bids on steel pipe and accessories and rein.-con. pipe with short lengths of steel pipe. $150,000.

Conn., Hartford—July 17, by Bd. Contr. & Supply of Metropolitan Dist., constructing stream control works and lower portion of Bills Brook Dam on east Branch of Farmington River, in Barkhamsted, involving 130,000 cu.yd. earth and 40,000 cu.yd. rock excav., 600,000 cu.yd. refill and embankment, 5,000 cu.yd. concrete masonry, Contr. 15.

La., Bogalusa—July 11, by H. E. Willis, engr., Bogalusa, drilling 1 and/or 2, and/or 3 flowing artesian wells, for City.

Mass., Boston—July 5, by City, Dpt. P. Wks., J. A. Rourke, comr., City Hall Annex, laying, relaying 8 in. and up c.i. watermains in Montmorenci Ave., East Boston, and Adams and Dana Sts., in West Roxbury.

Mass., Medford—July 6, by Commonwealth of Massachusetts Metropolitan Dist. Comn., W. E. Whittaker, secy., 20 Somerset St., Boston, furnishing, laying 5,000 ft. 60 in. diam. steel water pipe and necessary appurtenances. F. E. Windsor, ch. engr. Water Div.

N. J., Gladstone—De Pace & Juster, archts., 151 West 46th St., New York, taking bids water supply, incl. reservoir addition, pumps, storage tanks, masonry and plumbing work for Sisters of St. John the Baptist, Villa O'Connor. $10,000. Noted Nov. 24, under "Buildings."

B. C., West Summerland—July 7, by F. J. Nixon, municipal clk., Municipal Office, supplying, installing complete pumping plant for Dominion Experimental Station Pumping scheme, Summerland. $25,000. R. A. Barton, Penticton, civil engr.

CONTRACTS AWARDED

Ill., Chicago—Dpt. P. Wks., City Hall, backfilling ditches made for Div. Water Pipe Extension in laying water pipe during period ending Dec. 31, 1933, to B. C. Brantigam, Inc., 4846 Elston Ave., $7,205. Awarded June 21. Noted May 25.

Mont., Deer Lodge—City, constructing new waterworks system, to Lease & Leigland, Great Falls. Est. $180,000. Bids called Aug. 31, but award of contract held until now, waiting approval of Reconstruction Finance Corp. loan. Burns & McDonnell Eng. Co., 417 East 13th St., Kansas City, Mo., engrs. Noted June 8.

O., Cincinnati—A. S. Bibbs, supt. Waterworks, abandoning watermains and reconnecting and renewing service branches in various streets for Waterworks Dept., to O'Connell & Sweeney, Kellogg and Tennyson Sts., $27,945.

Wash., Seattle — Bd. P. Wks., constructing mains in Alki Ave., to Queen City Constr. Co., 603 18th Ave. S., Seattle, $72,915. Est. $100,000.

Section Index

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Unclassified 210
Waterworks 207

Buildings:

Public 212
Commercial 213
Industrial 213

Federal Government projects are classified under heading denoting type of work and designated by symbolt †.

◆

Wis., Milwaukee—Dpt. P. Wks., City Hall, watermains in North 30th St. from West Vliet to West Galena Sts., to S. W. & S. Constr. Co., 649 South Oak Park Court, $2,358***in North 30th St. from West Center to West Burleigh Sts., to General Contractors, Inc., 494 North 49th St., $7,082***North 31st St., to F. A. Goll, 4934 West State St., $6,218. Grand total $15,658. Noted June 8.

SEWERAGE AND WASTE DISPOSAL

PROPOSED WORK

Conn., Hartford—City, Metropolitan Dist. Comn., Sewer Dept., seeking Federal Aid through Industrial Control Bill for sewerage project, incl. disposal plant, South Meadows trunk line along Connecticut River and another Pope Park through Jefferson and Stonington Sts., also branch interceptor (2) sewers westerly end Pope Park to Capital Ave., New Britain Ave. with provision for extension to serve West Hartford and Bloomfield. $3,000,000. Metcalf & Eddy, Statler Bldg., Boston, Mass., consult engrs.

Conn., West Hartford (br. Hartford)—Town Council directed Street Comn. to make application to Federal Govt. for loan of $400,000 under National Recovery Act for construction of new center sanitary trunk sewer.

Ia., Cedar Rapids—City plans surveys sewage disposal plant with auxiliary piping, etc. $400,000. F. E. Young, city engr. H. B. Green Co., 417 1st Ave. S.E., engr. Noted May 18.

Mich., Elberta—See "Waterworks."

Mich., Mt. Clemens—City preparing plans concrete and monolithic concrete trunk line sanitary sewers and sewage disposal works to treat sewage of city, before emptying it into Clinton River. $250,000. B. W. Harvey, city engr.

Minn., Grand Rapids—City plans sewage disposal plant. $75,000. May ask federal financing. C. J. Eiles, city clk.

N. C., Tryon—City plans 6 in. c.i. sewer line, 2 ft. wide, 4 ft. deep between Tryon and Lynn and within city limits. C. H. Helms, city mgr.

O., Bedford—City drawing plans and takes bids in August primary disposal system, settling tanks, grit chambers, sludge beds, digestors, and trunk sewer in West Glendale St. $133,000 loan approved by Reconstruction Finance Corp. R. F. MacDowell, Chester-Twelfth Bldg., Cleveland, engr. Noted June 15.

O., Berea—City will apply to Government for funds to construct activated or filter type sewage plant, $160,000; and trunk sewer, $75,000. C. W. Root, Society for Savings Bldg., Cleveland, engr. Noted Apr. 16, 1931.

O., Cleveland—Village of Pepper Pike plans application to U. S. Govt. for loan, to construct sewer in Brainard and North Woodland Roads, Pepper Pike, near here. F. A. Pease Eng. Co., Terminal Tower, engrs.

Okla., Muskogee—City plans sanitary sewer main extensions. $60,000. Application made to Reconstruction Finance Corp. for loan. T. P. Clouts, city engr.

Ore., Portland—Election July 21, $6,000,000 bonds, sewage disposal plant.

Pa., Monaca—See "Waterworks."

Tenn., Knoxville—N. Bass, city mgr., making application to Reconstruction Finance Corp. for loan of $200,000 to construct sewers.

Tex., Austin—City, c/o J. G. Morgan, mgr. plans under Federal P. Wks. Programme to construct sewage treatment plant, incl. pump plant, drying beds, filters, Imhoff tanks, $450,000; sanitary sewer extensions and laterals, $175,000.

Tex., Laredo—City filed application with P. Wks. Bd. for funds to construct sewerage system

Sewerage, etc. (Continued)

and disposal plant, $250,000, and incinerator plant, $40,000.

Tex., San Antonio—City made application to Texas Relief Commissioner for $1,700,000 loan (Public Works Loan) for improvements to present sewage disposal plant and creation of irrigation project in connection with plant. I. Ewig, city engr.

Tex., San Antonio — Harlandale Independent Dist., filing application for funds, and making surveys for sewerage system, Harlandale Twp., near here. Expect to secure funds from Federal Relief Bd. Address J. B. Laurey, San Antonio, Harlandale Dist., engr.

BIDS ASKED

N. Y., Buffalo—July 20, by W. A. Rathmann, comr. P. Wks., City Hall, constructing rein.-con., brick, or rein.-con. and brick drains, in lands of Erie and New York Central R.R., Mills St. between new channel of Buffalo River and Genesee St., Lindburg Dr., Fillmore Ave., Gibson and Stanislaus Sts., also outlet and retaining wall supported on pile foundations full width Smith St., inverted siphons and weir chambers. J. T. Mockler, city engr.

O., Columbus—July 25, by W. P. Halenkamp, dir. P. Serv., sewage treatment plant 50 mg. capacity dry weather flow and 100 mg. capacity storm, $2,150,000. Bids are to be taken on the treatment of sewage from city of Columbus and adjacent territory, contractor is to furnish and operate own sewage treatment works for a period of 5 years with the option on the part of the contractor to renew contract for 2 consecutive five-year periods. Payment will be made at the price bid per million gallons of sewage treated with provision for bonus and penalty if the quality of the effluent produced varies from that specified. P. W. Martzel, city engr.

Tex., Edinburg—See "Contracts Awarded."

CONTRACTS AWARDED

D. C., Wash.—District Comrs., District Bldg., 3 sanitary sewers, to Brady Bros., Inc., Wash., D. C., $16,188***sanitary sewer, to C. R. Guthrie, Mechanicsville, Md., $10,366***2 sanitary sewers, to R. D. Schlegel Co., Bethesda, Md., $3,280. Grand total $29,834.

Ga., Atlanta and Decatur—Cities of Atlanta and Decatur (joint), constructing 12,000 ft. rubble masonry box sewer in North Decatur Rd. from Peavine Creek to Fulton Co. line, $75,000. Owner builds. W. A. Hansell, City Hall, Atlanta, engr.

Me., Ellsworth—City, J. A. Cunningham, clk., City Hall, 2,000 lin.ft, 8 in. and up vitr. clay sewers, to Mansie I. Rogers, Bangor, $20,105.

Mass., Boston—City, J. A. Rourke, comr. Dpt. P. Wks., City Hall Annex, 8 in. and up concrete pipe, Sumner Brook Project, Hyde Park, to C. Repucci & Co., 10 Garden Court St., $9,842.

Mo., St. Louis—See "Excavation, Irrigation, Drainage and Waterways."

†**N. Y., Fort Slocum**—Con. Q.M., 39 Whitehall St., New York, reconstructing sewerage system, to J. Joseph, 103 Park Ave., New York. Est. $23,943. Noted May 4.

O., Mt. Healthy (br. Cincinnati)—Hamilton Co., enlarging sewage treatment plant, consisting of flow control chamber, dosing tank, pump station, final settling tank, rotary sprinkling filters, sludge bed and necessary appurtenances, to H. and F. Hosea, 622 Bway., Cincinnati. Est. $60,000. J. S. Raffety, co. san. engr.

Tex., Edinburg—City, laying storm sewerage system, involving 12,000 lin.ft. 16 in. concrete pipe. Most of work will be done by city forces. Est. $12,000 materials mostly. Engineer, c/o A. E. Brown, mayor.

Wis., Edgerton—City Bd., building for sewage disposal plant, to J. H. Findorff, Madison, $14,900. City buys most of equipment. Est. $30,000. Noted Apr. 27.

BRIDGES AND GRADE CROSSINGS

PROPOSED WORK

Calif., Los Angeles—City plans completed, concrete, steel bridge over P. E. tracks and Ramona Blvd., Soto St. incl. approaches, relocating sewers, constructing storm drain, etc., $110,000. R. W. Stewart, City Hall, engr.

Calif., San Diego—Supervs. San Diego Co. considering proposal to ask Reconstruction Finance Corp. for loan of $5,000,000 to finance bridge or a subway to connect San Diego City with Coronado across the bay.

Calif., Visalia—Tulare Co. plans constructing Cottonwood Creek bridge, $3,500; Deer Creek Bridge, $12,000; St. John's River Bridge, $10,000; and 2 bridges at South Fork of Kaweah River, $8,000. Funds to be obtained under National Industrial Recovery Act.

Ky., Louisville—City plans new 140 ft. concrete or steel bridge, Beargrass Creek and River Rd., $50,000. A. A. Krieger, city engr.

N. Y., New Scotland—Delaware & Hudson R.R. Co., J. MacMartin, ch. engr., Albany, soon lets contract eliminating grade crossing. $21,000. Cost, specifications and plans approved. Noted Apr. 14.

North Carolina—State Hy. Dpt., Raleigh, plans several bridges between Micaville and Route 10, Route 104, McDowell Co. $30,000. L. R. Ames, Raleigh, engr.

Tenn., Knoxville—N. Bass, city mgr., making application to Reconstruction Finance Corp. for $300,000 to construct 3 bridges.

Tex., Converse—Southern Pacific R.R., c/o R. W. Barnes, ch. engr., Houston, plans steel, concrete underpass, near here.

Tex., San Antonio—City making plans and surveys, 5 vehicular and pedestrian bridges, timber, rein.-con. (2) at Mitchell St., 1 at Culebra Rd., 1 at Guadalupe St. and 1 at Ruiz St. $150,000. I. Ewig, city engr.

Tex., San Angelo—City, c/o E. E. Lowrie, mgr., plans steel, concrete underpass, Santa Fe R.R. crossing at Harris and Bell Sts. and paving. **Maturity soon.**

BIDS ASKED

Ind., Monticello—July 5, by Bd. Comrs., White Co., constructing Norway Bridge over Tippecanoe River, and Cowdin Bridge. $17,910. C. Scott, Monticello, co. aud. Noted May 25.

Ind., Newcastle—July 8, by Comrs. Henry Co., constructing 3 bridges. $17,790. J. R. Leakey, Newcastle, aud. Noted June 1.

Miss., Batesville—July 10, by Bd. Supervs. Panola Co., bridge over drainage lateral emptying into McIvor Creek, near Old Star Place.

N. Y., Buffalo—July 10, by W. A. Rathmann, comr. P. Wks., reconstructing, renewing, protecting Louisiana Street Viaduct over Erie R.R. tracks, south of Exchange St., protecting footings 2 columns between 1384 ft. over Erie R.R. and 85 ft. over New York Central R.R.; repairing pavement in roadway at South End of 70 ft. span. J. Mockler, city engr. Noted June 22.

N. Y., Springbrook—W. D. Wiggins, ch. engr. (Central Div.), Pennsylvania R.R. Co., Union Sta., Pittsburgh, Pa., taking bids highway underpass with steel bridge over Bullis and Blossom Rds. $150,000.

Oklahoma—July 5, by State Hy. Dpt., Oklahoma City, 20 span 370 ft. I-beam bridge on concrete piers, at Supply, Woodward Co., $60,000; and 9 span 116 ft. rein.-con. trestle, at Pawhuska, Osage Co., $27,000. C. L. Wilson, state hy. engr.

†**Oregon**—July 6, by U. S. Eng., Portland, 1 steel highway bridge.

Oregon—June 28, by State Hy. Comn., Portland, bridge over South Fork Santiam River, 2 mi. west of Crabtree, Linn Co.; bridge over Mill Creek, on Dallas Coast-Coast Secondary Hy. 192, about ¼ mi. east of Buell, Polk Co. R. H. Baldock, state hy. engr.

CONTRACTS AWARDED

Ill., Chicago—Dpt. P. Wks., City Hall, viaduct for street railway purposes at East Roosevelt Rd. extended, to Ketler-Elliott Co., 3101 South California Ave., $95,065. Noted Mar. 9.

Ind., Fowler—Bd. Comrs. Benton Co., constructing Mud Creek and Sugar Creek Bridges, to Vincennes Bridge Co., Vincennes. L. M. Haggard, Fowler, engr. Est. $25,000.

Iowa—State Hy. Comn., Ames, 6 circular culverts on Project F.A.P. 29, to C. A. Holvik, Macon City, $590***one 40x24 I-beam bridge on same road, to A. R. Coffen, Decorah, $3,120; 7 box culverts, 4 circular culverts, 24x210 ft. continuous I-beam bridge, raising, widening 16x20 ft. I-beam bridge, on Project F-360, to E. A. Krame Co., Inc., Des Moines, $21,400***one 40x24 ft. and one 24x24 ft. I-beam bridges; 2 box culverts and 2 circular culverts on Project F.A.E. 343, to Hildebrand & Kragh, Belmond, $7,475, all foregoing Wright Co.***furnishing 2,100 ft. 15- to 24-in. concrete culvert pipe, Project F-376, Polk and Jasper Counties, to Wilson Concrete Co., Humboldt, $1,035***1,200 sq.yd. rip rap, Project P-259, Clay Co., to L. Plumb, Wapello, $2,328. Grand total $35,948. Noted June 15.

Mass., Lowell—City, Street Dpt., City Hall, repairing Pawtucket and Central Bridges. Owner builds. Est. exceeds $25,000.

Mass., Newton—City, G. Stuart, street comr., City Hall, rein.-con. culvert over Laundry Brook, at Jackson and Pearl Sts., to Richard White Sons, Inc., 67 Cherry Pl., West Newton, $26,500, Awarded June 20. Noted June 22.

Pa., Uniontown—Bd. Comrs., Fayette Co., H. L. Burchinal, chn. Court House, repairing bridge over Youghiogheny River, Perry Twp., to D. Goldberg, Uniontown, $14,728. Est. $20,000. Noted Sept. 1.

Tex., San Antonio—Missouri, Kansas & Texas Ry. Co., F. Ringer, ch. engr., Railway Exch. Bldg., St. Louis, Mo., underpass, East Commerce St., to E. L. Martin, North Texas Bldg., Dallas. Est. $25,000.

STREETS AND ROADS

BIDS ASKED

California—July 5, by R. E. Pierce, dist. engr. State Hy. Comn., 502 State Office Bldg., Sacramento, grading, concrete paving 0.6 mi. hy. and widening 2 bridges, at Sonora, Tuolumne Co.

California—July 5, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, grading 4.587 mi. Sect. A, Route 51, Hoopa Natl. Forest Hy., Trinity Natl. Forest, Humboldt Co.

California—July 6, by C. H. Sweetser, dist. engr. Jub. Rds., 461 Market St., San Francisco, oiling 16.394 mi. Sects. E and F, Route 23, Quincy-Beckwith Natl. Forest Hy., Plumas Natl. Forest, Plumas Co., 3.715 mi. Sect. A, Route 79, Morgan Summit-Morgan Springs National Forest Hy., Lassen Natl. Forest, Tehama Co.

†**California**—July 11, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, crushed graveling 13.748 mi. California Federal Lands Project 1, Hoopa Valley Indian Reservation, Humboldt Co.

†**California**—July 11, by C. H. Sweetser, dist. engr. P. Rds., 461 Market St., San Francisco, grading 4.265 mi. Sect. B, Route 5, Douglas City Peanut Natl. Forest Hy. in Trinity Natl. Forest, Trinity Co.

California—July 12, by State Hy. Comn., Sacramento, heavy fuel oil treating 6 mi. hy. and seal coat surfacing 9.3 mi. hy. at San Gabriel Canyon, near Azusa, Los Angeles Co. C. H. Purcell, state hy. engr.

†**Calif., San Rafael** — Con. Q.M., Hamilton Field, rejected bids paving aprons around hangar and shops at Hamilton Field, Marin Meadows Bombing Base. Noted May 4.

Colorado—July 5, by State Hy. Dpt., Denver, gravel surfacing 6.204 mi. hy. near Metheson on State Hy. 4, F.A.P. E-79-E, Constr. Div. 1, Elbert Co.; bituminous concrete surfacing 1.966 mi. Hy. 8, on East Colfax Ave., F.A. E-149-I, Constr. Div. 2, Denver Co. C. D. Vail, State Office Bldg., Denver, engr.

Delaware—July 19, by State Hy. Dpt., Dover, clearing, grubbing, grading 4.274 mi. Porters-Salem Church Rd., Contr. 316, New Castle Co.; 3.977 mi. Raymonds Neck Rd., Contr. 311; 6.897 mi. Zoar Camp-Angola Rd., Contr. 309; 4.037 mi. Hollandsville-Md. Line Rd., Contr. 304, all foregoing in Kent Co.; 2.3 mi. Pearson's Corner-Pratt School Rd., Contr. 303; 3.713 mi. Coverdale "X" Rd. to Smith School, Contr. 302; grading 5.714 mi. Todds Chapel Prospect Church Rd., Contr. 292, all foregoing in Sussex Co. W. W. Mack, Dover, engr.

Ia., Davenport—July 10, by Bd. Supervs. Scott Co., furnishing, applying 200,000 gal. road oil on trunk and county roads. J. M. Malloy, co. engr.

Kan., Kansas City—City Clerk rejected bids June 8, 3 in. brick on 8 in. concrete, 2 in. rock asphalt on 8 in. concrete, 2 in. asphaltic concrete on 8 in. concrete, 10 in. plain concrete or 9 in. rein.-con. paving 17,500 sq.yd. 7th St. Trafficway, from Kansas Ave. to Pawnee Ave. north approach to 7th St. bridge. Est. $60,000-$70,000. Will readvertise. C. E. Peterson, City Hall, engr. Noted Apr. 13.

Maryland—July 5, by State Roads Comn., G. C. Uhl, chn., Baltimore, sheet asphalt paving 0.7 mi. Contr. BC-129-72, Baltimore City; concrete paving 1.02 mi. Contr. M-253-1-52, Montgomery Co.; concrete paving and substructure for bridge over Catoctin Creek, on 2.46 mi. hy. Contr. F-168-1-52, F.A.P. E-263, Frederick Co. H. Willier, Jr., Federal Reserve Bank Bldg., Baltimore, engr. Former bids rejected. Noted June 15.

Mass., Boston—July 5, by J. A. Rourke, comr. Dpt. P. Wks., City Hall Annex, sheet asphalt or bitulithic paving Greenwich Park, Ward 4, from Columbus Ave. to railroad; James St., Ward 8, from East Newton to East Concord Sts.; Walk Hill St., Ward 19 from Washington St. to Hyde Park Ave.; Kilby St., Ward 3, from State to Milk Sts.; Post Office Square, Ward 3, from Water to Milk Sts.; Milk St., Ward 3, from Federal to Broad Sts.; Federal St., Ward 3 from Milk to Franklin Sts.; Congress St., Ward 3, from Milk to Franklin Sts.; Congress St., Ward 3, from State to Water Sts.; Pearl St., Ward 3, from Milk to Franklin Sts.; Oliver St., Ward 3, from Milk St., 154 ft. southerly***July 6, recut granite block and sheet asphalt or bitulithic paving Dorchester Ave., Wards 16 and 17, from point 270 ft. north of Mercier Ave. to Washington St.; Washington St., Ward 17 from Dorchester Ave. to bridge over Neponset River; Adams St., Ward 17 from Washington St., 120 ft. easterly***July 6, sheet asphalt or bitulithic paving Pasadena Rd., Ward 14, from Normandy St. to Blue Hill Ave.; Robey St., Ward 8, from East Cottage St., southerly; Groom St., Ward 7, from Humphreys to Hillsboro Sts.***July 10, sheet asphalt or bitulithic paving Glenmont St., Ward 22, from Foster to Lake Sts.; Elmdale St., Ward 16, from Adams to King Sts.; Pompeii St., Ward 8, from Massachusetts Ave. to Allerton St.*** July 11, Hunneman St., Ward 8, from Washington to Albany St.; Yeoman St., Ward 8 from Albany to Hampden Sts.,

Mass., Eastham—July 5, by Commonwealth of Mass., Dpt. P. Wks., F. E. Lyman, comr., 100 Nashua St., Boston, bituminous concrete paving 2,050 ft. town aid project.

Mass., Haverhill—See "Contracts Awarded."

Mass., Malden—City, J. J. Connell, clk., City Hall, rejected bids asphalt street surfacing for year 1933. Will readvertise.

Mo., St. Louis—July 25, by Bd. P. Serv., City Hall, curbing, guttering, asphalt or warrenite bitulithic paving 3,310 sq.yd. Morgan St. (now Delmar Blvd.), from 12th to 14th Sts., $17,960; 5,710 sq.yd. Morgan St. from Grand Blvd. to Spring Ave., $36,360; concrete sidewalks, asphalt paving 3,125 sq.yd. connecting road from Morgan St. from Spring Ave. and Delmar to Enright Sts., etc., $16,720; 10,730 sq.yd. Lindell Blvd., $52,680; concrete sidewalks 11,600 sq.ft. Morgan St. from 12th to 14th Sts., $2,070; 14,270 sq.ft. Morgan St. from Grand Blvd. to Spring St., $2,650; 10,400 sq.ft. Lindell Blvd., $1,620. W. W. Horner, city engr.

†**Nevada**—July 6, by C. H. Sweetser, dist. engr. Pub. Rds., 461 Market St., San Francisco, grading 5.199 mi. Sect. A, Route 2, Mt. Rose Natl. Forest Hy. in Tahoe Natl. Forest, Washoe Co.

†*Federal Government.*

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Streets and Roads (Continued)

N. J., Princeton—See "Contracts Awarded."

N. Y., Buffalo—July 10, by W. A. Rathmann, comr. P. Wks., repairing asphalt pavements maintained by Dpt. P. Wks. from July 1, 1933 to June 30, 1934; constructing and repairing concrete sidewalks and sidewalk approaches from date of contract to June 30, 1934; paving Hazelwood Ave.; repaving Hoyt and Baynes Sts., Beard and Jewett Aves. J. T. Mockler, city engr.

†N. Y., Fort Jay—Con. Q.M., 39 Whitehall St., New York, rejected bids June 15, concrete roads, sidewalks, adjacent to detachment barracks, Governors Island. Noted June 1.

Oklahoma—July 5, by State Hy. Dpt., Oklahoma City, grading, drainage 3.7 mi. State Hy. 60, west of Bartlesville, $38,000, 3 mi. same road east of Pawhaska, $40,000, both Osage Co.: 7.5 mi. Hy. 35, south of Supply, $65,000; 7 mi. same road, north of Woodward, $60,000, both Woodward Co.; 3.6 mi. State Hy. 18, north of Meeker, $32,000; 5 mi. same road near Sparks, $47,000; and 5 mi. same road south of Chandler, $50,000, all Lincoln Co. C. L. Wilson, state hy. engr.

†Oregon—July 7, by U. S. Eng., Portland, grading paving 8.7 mi. roads.

Tex., Longview—July 6, by Gregg Co., c/o H. A. Leaverton, judge, Unit 1, clearing, grubbing, grading, small and large drainage structures, Unit 2, crushing, hauling, spreading and placing iron ore gravel and iron ore rock for base and surface courses, on 103 mi. roads. Owner furnishes material. Fooshee & Davis, Longview, engrs.

Utah—July 5, by State Road Comn., Ogden, oil processing roadbed 18.642 mi. state highway between Grantsville and Timpie, Tooele Co. and between Moark and Castilla, Utah Co. $50,000 ***20.508 mi. hy. between Kanosh and Dog Valley, Millard Co., and between Paragonah and Parowan Iron Co. $55,000***plant mix bituminous surfacing 29.69 mi. road between Knolls and Salduro, Tooele Co. $165,000. H. S. Kerr, state hy. engr.

Utah—July 6, by State Hy. Comn., Salt Lake City, concrete paving 0.875 mi. road at Salem and on 5th West St., Provo, F.A.P. 34 and 36 combined Utah Co.; alternate types paving 3,383 mi. road between Death Curve and Ogden, F.A.P. 114 A and B, and 123 combined, Weber Co.; 85 ft. concrete rigid frame structure over Jordan River, on Airport Rd., Salt Lake Co. H. S. Kerr, state hy. engr.

Virginia—July 6, by State Hy. Dpt., Richmond (**R. means Route and P. Project**), asphalt on concrete paving 0.4 mi. R. 31, P. F-183, W2, Stafford Co.; macadam paving 0.8 mi. R. 33, P. F-645-E, Rockingham Co.; 0.22 mi. R. 33, P. F-560-E, Shenandoah Co.***soiling 6.6 mi. R. 41, P. F-565-L1; 178 ft. bridge on R. 41, P. F-565-B4, both Fluvanna Co.; 65 ft. bridge on R. 31, P. F-182-B3, Prince William Co.

Washington—L. V. Murrow, dir. Hys., Olympia, cancelled bids to have been opened July 6 and July 11, for improving state highways. Will readvertise. Noted June 22.

Wash., Bellingham—July 12, by Comrs. Whatcom Co., grading, concrete paving 1¼ mi. Guide Meridian Rd. from Linden north to British Columbia Boundary, 20 ft. $40,948. J. N. Adams, Bellingham, co. engr. Noted May 18.

Wash., Port Townsend—July 5, by Comrs. Jefferson Co., constructing 1.28 mi. Dabob-Quilcene Rd. S. B. Edwards, Port Townsend, co. engr.

Wash., Seattle—July 10, by Comrs. King Co., grading, graveling 2 mi. West Snoqualmie Valley Hy. $25,000. T. D. Hunt, Seattle, co. engr.

Wash., Seattle—Comrs. King Co. cancelled bids to have been opened July 12, paving 1.14 mi. Renton Ave.-Empire-Way, Renton Rd. $24,080. Will readvertise. T. D. Hunt, co. engr. Noted May 25.

CONTRACTS AWARDED

Calif., Los Angeles—Bd. P. Wks., grading, curbing sanitary sewers, compressed concrete paving, 32nd St. from Figueroa St. to Shrine Pl., to P. J. Akmadzich, 3029 Gilroy St., $29,644. Awarded June 12.

Connecticut — J. A. Macdonald, state hy. comr., Hartford, rolled bank run gravel surfacing 9,314 ft. hy. Andover, to Lane Constr. Corp., 134 State St., Meriden, $14,096***10,683 ft. Sprague and bituminous macadam paving 100 ft. and asphaltic concrete paving 2,982 ft. Darien, to Sapelli Bros. & Hertz, Stamford, $11,377 and $15,503 respectively***rolled bank run and rolled crushed gravel surfacing 7,450 ft. Bethel, to Innis Bros., Watertown, $5,534***loose gravel surfacing 16,210 ft. Tolland, and rolled bank run gravel surfacing 7,825 ft. Clinton, to Bloomfield Constr. Co., Bloomfield, $9,871 and $17,895 respectively***traprock waterbound macadam paving 10,075 ft. Waterford and 38 ft. span bridge over Longmeadow Creek, Naugatuck, to L. Suzio Constr. Co., State and Brooks Sts., Meriden, $36,912 and $10,189 respectively***2½ in. trap rock bituminous macadam on 3½ in. trap rock surfacing 853 ft. Stone, Allabon, Byrnes and Ohrstrom Driveways, and sheet asphalt paving 4,849 ft. Putnam Ave., Greenwich, to Peter Mitchell, Inc., Greenwich, $2,621 and $48,626 respectively. Grand total $172,624.

Ill., Havana—Dpt. P. Wks. & Buildings, Div. Hys., Havana, concrete paving 4.034 mi. State Aid Route Sect. 2-MFT and grading 2.367 mi. State Aid Route Sect. 2A-MFT, to P. Simons Sons, Quincy, $34,909 and $3,910 respectively.

Iowa—State Hy. Comn., Ames, paving 6.275 mi. Project F 29, Sect. C, to Capital Constr. Co., 1207 Cherry St., Des Moines, $157,627*** 0.398 mi. Project F 267, Sects. D and F, to Wright Constr. Co., Des Moines, $12,753*** 7.746 mi. Project F-343, to Union Constr. Co., 2nd St. and New York Ave., Des Moines, $164,632. Grand total 335,012. Noted June 15.

Ind., Indianapolis—City, concrete paving 8,680 sq.yd. South Meridian St. from Morris to Palmer Sts., to Hoosier Constr. Co., Indianapolis, $25,407 ***5,320 sq.yd. same street from Palmer to Adler Sts., to Mead Constr. Co., 800 North Olney St., $19,334***7,000 sq.yd. same street from McCarthy to Morris Sts., to Indianapolis Asphalt Paving Co., 2810 Columbia Ave., $23,578***6,000 sq.yd. South Illinois St., to Abel Bros., 1501 South Senate Ave., $14,410*** 3,000 sq.yd. Russell Ave., to W. D. Vogel, 506 Inland Bank Bldg., $13,177. Grand total $95,906.

Iowa—State Hy. Comn., Ames (**P. means Project**), to Roverud Bros., Spring Grove, Minn., crushed stone on P. M-238, Fayette Co. $2,604 ***to Haegg Constr. Co., Cedar Rapids, P. M-233, Bremer Co. $3,220***to Hewitt Bros., Westgate, P. M-236, Chickasaw Co. $2,817***to R. Slifka, Cresco, P. M-241, Howard Co. $768*** to Falk & Litzelman, St. Ansgar, P. M-243, Mitchell Co. $3,099***to O. H. Ehling, Charles City, P. M-239, Floyd Co. $3,339***to Baker & Patton, Carlisle, P. M-242, Humboldt Co. $3,350; P. M-237, Emmet Co. $2,515; P. M-246, Wright Co. $1,169***to L. J. Peters, Des Moines, P. M-247, Adair Co. $5,805; to W. T. Kelley, Des Moines, P. M-435, Page Co. $1,128; P. M-432, Harrison Co. $4,399; P. M-437, Shelby Co. $3,440***to R. H. Dixon, Mystic, P. M-436, Ringgold Co. $7,683***to Sargent Bros., Des Moines, P. M-429, Decatur Co. $3,468 ***to Yant Constr. Co., 1146 Omaha Natl. Bank Bldg., Omaha, Neb., P. 434, Mills Co. $2,250*** to Wahl Constr. Co., Victor, P. M-439, Union Co. $1,836; P. M-433, Madison Co. $1,402; P. M-137, Poweshiek Co. $4,491; P. M-138, Tama Co. $5,637; P. M-139, Marshall Co. $2,816 ***to Ferguson-Diehl Constr. Co., Dana, P. M-150, Webster Co. $2,293; P. M-148, Hamilton Co. $1,117***to J. R. Paul Jefferson, P. M-145, Carroll Co. $1,471; P. M-146, Greene Co. $3,990 ***to R. Cook, Nevada, P. M-149, Hardin Co. $904***to H. C. Young, Prairie City, P. M-142, Polk Co. $368***to Kibbey & Goulke, Carlisle, P. M-140, Jasper Co. $2,733***to C. A. Emery, Coon Rapids, P. M-147, Calhoun Co. $7,130*** to Kaser Constr. Co., Adel, P. M-143, Dallas Co. $1,971***to Nelson & Melohn, Nevada, P. M-144, Story Co. $1,849. Grand total $91,062. Noted June 8.

Iowa—State Hy. Comn., Ames, grading 0.959 mi. State Park Project 30, Spirit Lake Preserve, Dickinson Co. to Asphalt Paving Corp., 2100 East 4th St., Sioux City, $6,42***1 cattle pass and one I-beam bridge, to Graves Bros., Melvin, $2,620. Awarded June 21. Noted May 1.

Iowa—State Hy. Comn., Ames, grading, concrete paving 71,816 sq.yd. Primary Rd. 60 from Eagle Grove south P. F-360, to O'Rourke Constr. Co., 1118 Mulberry St., Des Moines, $150,987; 47,018 sq.yd. Primary Hy. 60, Eagle Grove to Goldfield, P. F-29, D. E. F. to W. Horrabin Contg. Co., Iowa City, $101,963, both in Wright Co. Awarded June 22.

Ia., Grundy Center—Grundy Co., Court House, maintenance surfacing 68 mi. secondary roads, to H. N. McCoy, Waterloo, $14,035. Noted June 15.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 1.38 mi. Contr. Wi-111-14, F.A.P. E.249-C, Wicomico Co., to Hannemann-Burroughs Co., Salisbury, $39,060; 1.58 mi. Contr. Wi-107-1-14 F.A.P. E249, Wicomico Co., to Phillips Bros., Salisbury, $33,190. Noted Apr. 20.

Md., Baltimore—Bd. Awards, sheet asphalt paving 10,850 sq.yd. streets listed under Contr. 635, to Baltimore Asphalt Block & Tile Co., 1320 North Monroe St., $37,470. Noted June 15.

Mass., Haverhill—Commonwealth of Massachusetts, Dpt. P. Wks., F. E. Lyman, comr., 100 Nashua St., Boston, bituminous macadam and concrete widening, resurfacing 5 mi. various streets, day labor under supervision of Engineer of Commonwealth of Massachusetts. Est. $60,000.

Mississippi—State Hy. Comn., Jackson, to Hardaway Constr. Co., Columbus, Ga., roadway and bridges on 6 mi. Rankin and Simpson Counties, $66,922; roadway work 5.6 mi. Lowndes Co., $53,782; 8.6 mi. Chickasaw Co., $62,824; roadway work 8.5 mi. Tallahatchie Co., $67,098***to Pigford Bros., Meridian, bridges on Columbus-Artesia Rd., Lowndes Co., $39,938; Okolona-Shannon Rd., Chickasaw Co., $60,863***to J. A. and H. E. Pigford, Meridian, on Clarksdale-Tutwiler-Sumner Rd., Tallahatchie Co., $44,752***to Cobb Bros. Constr. Co., Meridian, constructing and surfacing 4.7 mi. Rankin Co., Alternate bid 2, $26,876***to A. Guthrie & Co., Builders Exch., St. Paul, Minn., paving 10 mi. Le Flore Co., $152,956***to Coastal Road Co., Birmingham, Ala., roadway and surface treating 15.6 mi. LaFayette and Marshall Counties, $62,786. Grand total $638,797. Awarded June 21. Noted Apr. 27 and May 4.

N. J., Princeton—Township Com., M. Clausen, clk., Twp. Hall, grading, 5 in. macadam paving Rocky Hill and Mount Rose Rds., day labor and buys materials. $17,750. Sincerbeau & Moore, 1st Natl. Bank Bldg., twp. engr.

N. Y., Buffalo—Div. Streets, to Rock Asphalt & Constr. Corp., Morgan Bldg., 2½ in. asphalt on 8 in. concrete repaving Forest Ave. from Niagara St. to West Ave., $8,258; 14th St. from Porter to Rhode Island Aves., $42,098; 14th St. from Pennsylvania to Porter Aves., $4,230; Hampshire St. $4,960***to Erie Contg. Co., Morgan Bldg., Forest Ave. from West to Parkdale Aves. $23,958***to Standard Paving, Inc., 945 Bailey Ave., Forest Ave. from Parksdale to Delaware Aves. $47,740***to H. P. Burgard, 1968 Fillmore Ave., Baynes St., $29,055***to M. L. Rupp, 46 Haven St., West Ave., $22,700. Grand total $182,999.

North Carolina—State Hy. Comn., Raleigh, crushed stone surfacing 6.35 mi. Alamance Co., to Cobb & Homewood, Chapel Hill, $34,604*** crushed shells compacted on 0.8 mi. Carteret Co., to F. J. McGuire, Durham, $3,876***topsoiling 7.16 mi. Bertie and Northampton Counties, and graveling 17.52 mi. Sampson Co., to E. W. Grannis, Fayetteville, $23,536 and $68,410 respectively***topsoiling, sand clay or crushed stone paving 8.9 mi. Rowan Co., to Welker Bros., Greensboro, $32,210. Grand total $162,636. Noted May 18.

North Carolina—State Hy. Comn., Raleigh, gravel surfacing 8.75 mi. Route 891, Stokes Co., to Elliott Building Co., Hickory, $23,448 est. $26,000***sand, asphalt paving 8.02 mi. P. 2021, Carteret Co. and 1.6 mi. P. 3692, Onslow Co., to Blythe Bros., Charlotte, $75,975, and $16,808 respectively, est. $68,000 and $14,000 respectively***crushed stone paving 6.85 mi. P. 9501, Jackson and Swain Counties, to N. L. Teer, Durham, $35,336, est. $39,000***structures on 8.18 mi. P. 8491, McDowell Co., to P. Gilmore, Wauchula, Fla., $10,084***concrete approaches to bridge over Trent River, P. 2064, Craven Co., to J. S. Bowers, Whiteville, $5,572, est. $4,300. Grand total $167,223. Will readvertise for bids grading, gravel surfacing 8.18 mi. Project 8491, McDowell Co., est $50,000. Noted May 18.

Pa., Pittsburgh—City, to M. O'Herron, 21st and McKean Sts., grading, paving, curbing 5th Ave., $14,178; Colby St., $7,674; Connor St., $4,203; Rapidan Way, $2,730; Saline St., $9,957 ***to Kelly Constr. Co., 7337 Kelly St., grading, paving Mosaic Way, $2,664***to Nardulli & Sons Co., 427 Serrano Ave., repaving Mulberry Way, $2,553***to Bucci Constr. Co., 375 Boquet St., sewer in Brinwood Ave., $534***to Schenley Constr. Co., 40 Boundry St., sewer in Connor St., $544. Grand total $45,037.

EARTHWORK, IRRIGATION DRAINAGE AND WATERWAYS

PROPOSED WORK

Calif., Richmond—City to seek National Recovery Funds to improve channel, involving rock removal at Potrero Point. $694,419.

Calif., San Luis Obispo—San Luis Obispo Co. surveys to be made of Morro Bay Harbor with a view to construct a breakwater. To exceed $25,000. Project to be financed by funds from National Industry Recovery Act. Work at Port San Luis is also contemplated. Engineer not appointed.

Colo., Ordway — Twin Lakes Reservoir & Canal Co., O. R. Smith, ch. engr., Ordway, temporarily deferred taking bids to have been opened June 22, constructing Independence Pass Trans-Mountain Water Diversion System, 20 mi. east of Aspen, involving tunnel excav., ditch and dam construction. Schedule 1, 3.8 mi. tunnel, 9 ft. 2½ in. diam., 3.9 mi. canal, 75,000 cu.yd. canal and portal excav., 120,000 cu.yd. rock and earth embankment for dams. Schedule 2, 1.75 mi. tunnel 8 ft. 2½ in. diam., 5.7 mi. canals, 140,000 cu.yd. portal and canal excav., 6,000 cu.yd. rock and earth embankment for dams. Noted June 8.

†Conn., New Haven—U. S. Eng., Providence, R. I., making plans widening channel 25 ft. at Tomlinson Bridge south of Long Island Sound, in New Haven Harbor. $290,000.

Fla., Jacksonville Beach—Duval Co. (Jacksonville), plans election July 7, for approval of construction 7 mi. sea wall or bulkhead back on beaches from St. Johns River south, with concrete walks or parade plazas at bathing beaches. $800,000 to $1,000,000. It is proposed to obtain one-half the money from Reconstruction Finance Corp. by the county and one-half is to be paid pro-rata by owners of waterfront property. The whole to be paid for over period of 15 years. E. P. Luce, Liggett Bldg., Jacksonville, engr.

Ill., East St. Louis—East Side Levee & Sanitary Dist., S. H. Kernan, pres., 628 Missouri Ave., making plans diversion Cahokia Creek into Mississippi River, above here and covering present creek bed through city, pumping station, etc. $2,000,000. Contemplate inclusion in Public Works Programme. E. F. Harper, c/o owner, ch. engr.

Mass., Ipswich—P. Sanger, archt., 570 Lexington Ave., New York, taking preliminary estimates for 200x1,200 ft. artificial lake, dam and widening river on Bay Rd. Estate, Lake 2, for C. A. Hay, 1 Sutton Pl., New York. To exceed $25,000. R. Allen, Ipswich, engr. Formal bids to be taken after July 15. Noted June 22.

Tex., San Antonio—See "Sewerage and Waste Disposal."

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†*Federal Government.*

Earthwork, etc. (Continued)

Tex., San Antonio—Bexar Co. filed application for funds with Bd. P. Wks. Act, to construct irrigation system at county farm, involving drilling several water wells and providing water distributing lines. $100,000. W. S. Goodman, San Antonio, co. engr.

Va., Virginia Beach—Plans drainage improvements, incl. sewerage disposal and mosquito eradication. $1,000,000. Money will be sought through Government's Public Wks. Bill.

BIDS ASKED

Calif., Los Angeles—July 10, by Bd. Supervs, Los Angeles Flood Control Dist., 202 North Bway., construction in Eaton Wash, at Washington St., of earth fill debris dam 1,545 ft. long, 37 ft. high, 40.5 ft. from founds. to spillway crest, upstream face to be concrete slab (poured or gunite), bids will be taken on 3 proposals (1) all work complete (2) earth work (3) concrete and miscellaneous work. Proposal 1, all work, consisting of clearing and grubbing 10.5 acres dam site; stripping 40,000 cu.yd. dam site; preparing found. 9 acres; structures, 164,000 cu.yd. excav.; 3,100 cu.yd. excav. (cut off trenches); 167,000 cu.yd. excav. (borrow pit No. 1); 196,000 cu.yd. excav. (borrow pit No. 2); 147,000 cu.yd. embankment, impressions, Class A; 265,000 cu.yd. embankment, impressions, Class B; 1,450 cu.yd. backfill, tamped, Class A; 8,850 cu.yd. backfill untamped, Class B; 930 cu.yd. concrete, cut-off walls; 3,540 cu.yd. concrete, floor slabs (Class B); 250,000 sq.ft. gunite facing slabs, alternate 3,980 cu.yd. concrete facing slab; 2,640 cu.yd. retaining wall (Class D); 2,125 cu.yd. concrete outlet conduit (Class E); 1,450 cu.yd. concrete spillway (Class E); 1,250,000 lb. placing reinforcing steel; 200,000 lb. placing gates, hoists, stems, etc.; 44,000 lb. placing trash racks; 8,000 lb. placing miscellaneous metal; 1,000 lb. placing metal hand rails; 200 lin.ft. placing tile drains; 100 lin.ft. drilling dowel holes; Proposals 2 and 3 as stated including above items. $441,376. E. C. Eaton, 202 North Bway., engr.

†Calif., Suisun—July 5, by U. S. Eng., Calif. Fruit Bldg., Sacramento, dredging 489,000 cu.yd. from Suisun Bay, near mouth of New York Slough and from New York Slough between its mouth on Suisun Bay and mouth of Middle Slough, Solano Co.

†Florida—U. S. Eng., Jacksonville, taking bids dredging 4,350,000 cu.yd. from St. John's River between Brown's Creek and Fulton. (Date not set.)

†Fla., Fort Pierce—U. S. Eng., Jacksonville, taking bids furnishing, placing 31,000 tons new stone and resetting 7,500 cu.yd. stone for repairs to north and south jetties. (Date not set.)

Mo., St. Louis—See "Contracts Awarded."

N. Y., Buffalo—July 10, by City, W. A. Rathmann, comr. P. Wks., dredging Buffalo Inner Harbor to completed contract depth for maintenance of channel from July 1, 1933 to June 30, 1934. J. T. Mockler, city engr.

†Oregon—U. S. Eng., Portland, taking bids restoring north and south jetties at entrance Coos Bay, incl. 270,000 tons stone; removing 8,800 cu.yd. sub-aqueous rock in upper Columbia River between Celio Falls, Arlington; constructing rubble mound south jetty at entrance to Tillamook Bay, requiring 200,000 tons stone, 60,000 lin.ft. piling, 575 M.F.B. lumber, 20,000 lb. drift bolts, 130 tons rails, 15,000 lb. spikes, 14,000 lb. machine bolts, 20,000 lin.ft. wire cable; dredging 5,730,000 cu.yd. from Columbia River opposite Harrington Point about 90 mi. below Portland; 3,103,000 cu.yd. in Willamette River; 950,000 cu.yd. in Columbia River from Interstate Hy. Bridge at Vancouver, to point 8,500 ft. down stream; 904,000 cu.yd. from Bakers Bay north of Sand Island, near mouth of Columbia River; constructing stone fill dike between west end Sand Island and Cape Disappointment with a stone revetment at Sand Island and constructing stone revetment at east end Sand Island, incl. 120,000 cu.yd. stone. (Date not set.)

†Texas—U. S. Eng., River & Harbors Comm., Wash., D. C., bids about July 21, constructing outer channel, jetties, dredging, widening, deepening, cutting Brazos-Santiago Deep Water Project, near Port Isabel. $2,158,000. General appropriation made. Noted Apr. 7, 1932.

†Tex., Galveston—July 26, by U. S. Eng., Galveston, dredging 4,312,000 cu.yd. from Galveston Channel. $360,000. Noted June 15.

†Tex., Port Bolivar—U. S. Eng., Galveston, taking bids sheet pipe and stone dike at entrance Louisiana-Texas Intracoastal Waterway into Galveston Bay, near here, incl. 6,600 tons stone, 60 cu.yd. fill, 8 cu.yd. concrete, 1 each manhole and cover, also interlocking sheet piles. (Date not set.)

†Wash., Seattle—U. S. Eng. taking bids dredging 1,890,000 cu.yd. from Duwanish Waterway, Seattle Harbor. (Date not set.)

†Wash., Tacoma—U. S. Eng., Seattle, taking bids dredging 195,000 cu.yd. from City Waterway. (Date not set.)

†Alaska—U. S. Eng., Seattle, Wash., taking bids dredging 5,400 cu.yd. loose material and removing 3,500 cu.yd. rock from Sitka Harbor. (Date not set.)

N. S., Sandy Cove—July 10, by Secretary Dpt. P. Wks., Ottawa, Ont., breakwater repairs, cribwork in place fully ballasted 54,804 cu.ft., 4 in. sheathing in place 9,056 ft. B.M., 12x12 in. creosoted pipe caps in place; 5,940 ft. B.M. hardwood creosoted piling in place, 1,260 lin.ft., removal of old or existing rock. $11,900. K. M. Cameron, Ottawa, Ont., engr.

CONTRACTS AWARDED

Calif., La Mesa—Directors of La Mesa, Lemon Grove & Spring Valley Irrigation Dist., replacing 1.5 mi. wooden flume east of El Cajon with 36 in. rein.-con. syphon, to American Concrete & Steel Pipe Co., 4635 Firestone Blvd., Southgate. $35,000. Noted Mar. 2.

Mass., Gosnold—Commonwealth of Massachusetts, Dpt. P. Wks., F. E. Lyman, comr., 100 Nashua St., Boston, dredging 23,000 cu.yd. in Cuttyhunk Harbor, channel 10 ft. deep at mean low water, basin 300 ft. wide, 500 ft. long, 10 ft. deep at mean low water, Scheme 2, to Saybrook Dredging Co., Saybrook, Conn., $5,971.

Mass., Lynn—Lamper's Inc., 496 Broad St., 300 ft. pile, timber bulkhead, to John H. Proctor Co., Inc., 250 Stuart St., Boston. General contractor has sublet pile driving to Crandall Eng. Co., 134 Main St., Cambridge.

Mo., St. Louis—Bd. P. Serv., City Hall, constructing necessary retaining walls, etc., to prevent further sliding in Busche Park at South Calvary Ave. and Bway., $20,000; reconstructing slope of certain portions open channel of River Des Peres Drainage Works, $32,000; constructing and reconstructing sewer inlets in various parts of city, $30,000, by city forces. W. W. Horner, city engr.

†New York—U. S. Eng., Army Bldg., 39 Whitehall St., New York, dredging 203,400 cu.yd. in Glencove Creek, to H. H. Bartlett, 64 West 31st St., Bayonne, N. J., $35,188. Noted June 1.

†Ore., Portland—U. S. Eng., Custom House, reconstructing and miter sill and thrust walls, emergency dam, etc., in Willamette River, to Parker-Schram Co., Couch Bldg., $69,706. Noted May 25.

†Tex., Freeport—U. S. Eng., Galveston, repairing jetties at entrance to Freeport Harbor, to D. M. Picton & Co., Port Arthur, $62,910. Noted May 4.

UNCLASSIFIED

PROPOSED WORK

Ala., Birmingham—ELECTRIC DISTRIBUTION—Homewood, suburb of Shades Valley, near here, seeking loan from Reconstruction Finance Corp. for construction of municipal electric distributing system, to be self-liquidating in 10 year period. $70,000. W. C. Bryant, mayor, handling negotiations.

Arizona—GAS LINE—Western Gas & Oil Co., Bassett Tower, El Paso, Tex., plans constructing natural gas line from Douglas and Bisbee to Phoenix and Tucson. $2,200,000 loan requested from Reconstruction Finance Corp.

Calif., Pittsburg—TERMINAL—City to seek loan under National Industry Recovery Act to construct shipside terminal. $250,000.

Ga., La Grange—SWIMMING POOL, etc.—City Council, City Hall, preliminary plans 75x125 ft., concrete swimming pool, pavilion and bath houses. $20,000. Ivey & Crook, Candler Bldg., Atlanta, engrs. Noted June 22.

†Kan., Fort Leavenworth — FUELING SYSTEM—Con. Q.M., postponed indefinitely bids to have been opened June 8, gasoline fueling system. Noted June 4.

Ky., Louisville—PARK IMPROVEMENTS—Bd. Park Comrs., City Hall, plans expending $113,000 improving Seneca Park, adjoining Cherokee Park and Bowman Field, incl. 18 hole golf course, constructing amphitheater, erecting club house, damming Beargrass Creek to form artificial lake, several miles square extent, considerable road construction. D. McDonald, Jr., pres. Park Bd. Stonestreet & Ford, Louisville Trust Bldg., engrs.

Michigan—GAS PIPE LINE—Michigan Natural Gas Corp., Mt. Pleasant, plans and surveys started for pipe line system from Broomfield oil fields to Flint and Pontiac to include 50 mi. 8- to 20-in. steel pipe, also plant to utilize casing head gas from oil wells and compression stations on pipe line. Est. exceeds $1,000,000. W. F. Brown, Mt. Pleasant, engr. Noted Jan. 5.

N. J., Newark—RAILWAY—City application for loan $2,850,000 to complete municipal railway has been approved by Advisory Bd. of Reconstruction Finance Corp. and referred to directors of Corporation.

N. J., New Milford—CEMETERY—Corporation, c/o E. M. Gaines, in charge, Rose Hill Memorial Park Assn., Hartford, Conn., preliminary sketches purchasing, opening, developing 80 acre tract of land east of River Rd. from the township for cemetery, incl. clearing, grading, walks, drives, landscaping and buildings. $50,000. Private plans.- Bd. City Council will sell land as soon as project is approved. Noted June 15.

N. J., Paramus—SWIMMING POOL—J. L. T. Tillack, archt. and engr., 173 Main St., Hackensack, soon takes bids swimming pool, incl. excavating grading, deepening present pond, rein.-con. retaining walls, purifying apparatus, locker building, Franklyn Turnpike, for Owner, c/o architect. $25,000. Excavation and concrete work awarded to G. M. Brewster, Fort Lee Rd., Bogota.

N. M., Loveland — RAILROAD — Atchison, Topeka & Santa Fe R.R., G. W. Harris, ch. engr., 80 East Jackson Blvd., Chicago, Ill., plans 18 mi. railroad spur from railroad to potash deposit near here.

N. Y., New York—BATHHOUSES—J. Stubennvoll, 965 East 241st St., plans by J. Vinci, 3103 Westchester Ave., 2 story, 32x70 ft. bath houses, Outlook Ave. and Bay Shore.

N. Y., New York—FIELD HOUSE and LOCKERS—Park Dpt., Arsenal Bldg., Central Park, plans 28x85 ft. field house and lockers, McCombs Dam and Ruppert Pl. $50,000.

N. C., Charlotte—SMELTING PLANT—Jas. H. Carson and Dr. R. F. Holland, seeking government funds from Bureau of Mines to construct smelting plant for gold ore that is being mined in Mecklenburg, Gaston, Iredell, Anson, Montgomery and Stanly Counties. $60,000.

N. C., Morehead City—PORT TERMINAL—Morehead City Terminal Co. filed application with Reconstruction Finance Corp for loan, for construction of large port terminal. $400,000. L. Hamilton and S. Woodland, Morehead, members of comn. promoting project. Noted Jan. 19.

†Okla., Fort Sill—DISTRIBUTION SYSTEM, etc.—Con. Q.M., rejected bids May 18, extending electric distribution system, street lighting system and transformer vaults, also 14,000 ft. 12 in. c.i. watermains, etc. Noted May 11.

Tex., Austin—UNDERGROUND ELECTRIC DISTRIBUTION SYSTEM—City, c/o J. G. Morgan, mgr., plans under Federal P. Wks. Programme, underground electric distribution system for downtown area. $350,000.

Tex., Laredo—STADIUM, AIRPORT and SWIMMING POOL—City filed application with Bd. P. Wks. Act for funds to construct municipal stadium and exposition park, est. $250,000, municipal airport $75,000, and municipal swimming pool, $30,000.

Tex., San Antonio — ADMINISTRATION BUILDING, HANGARS, etc.—City, c/o C. R. Quin, mayor, made application for Public Works Loan to construct administration building, hangars, etc. at Winburn Field. $255,000. I. Ewig, city engr.

Tex., San Antonio — GRECIAN GARDEN — City, c/o C. Q. Quin, mayor, made application to Texas Relief Commissioner, for P. Wks. loan, to construct complete Grecian sunken garden (municipal), in Breckenridge Park. I. Ewig, city engr.

Tex., San Antonio—HORSE RACING TRACK, etc.—City, c/o C. R. Quin, mayor, made application to Texas Relief Commissioner for loan (Public Works Loan) of $400,000 to construct horse racing track and grandstand. I. Ewig, city engr.

Tex., San Antonio—STADIUM—City, c/o C. K. Quin, mayor, made application to P. Wks. Bd. (Federal), for funds to construct athletic stadium. $800,000. I. Ewig, city engr. Noted Apr. 20.

Ont., Little Long Lac—HYDRO-POWER LINE—Beardmore Gold Mines Ltd. plans hydropower line and mill. $75,000.

BIDS ASKED

Calif., Pasadena—GRAVITY DAM—See "Contracts Awarded."

N. J., Hackensack—SWIMMING POOL—See "Contracts Awarded."

Pennsylvania—CAMPS, etc.—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Pasadena—GRAVITY DAM—Alta San Rafael Co., Pasadena, constructing straight gravity dam, 11 ft. high, 165 ft. long at crest across Arroyo Seco between Colorado St. and Holly St. Bridges, for conservation and domestic use, force account. To exceed $17,750. Allin Bros., Kendall Bldg., Pasadena, engrs.

Conn., Groton — CEMETERY — Congregation Beth-El, Groton, cemetery, Lester Rd., masonry, walls, entrance, to T. Occhialini, 492 Montauk Ave., New London; filling roads, etc., grading, to Spicer Ice & Coal Co., 25 Thames St. Est. $20,000. E. L. Deshefy, 65 West St., New London, engr.

La., Lake Charles — WHARF UNIT, etc. — Lake Charles Harbor & Terminal Dist., completing new 200x900 ft. wharf unit and 160x700 ft. shed, 10 ft. concrete apron in rear of shed, depressed railroad tracks at back of wharf. Owner builds. Construction was tied up year because of suit against original contractor Mr. Olivier. Commission will complete work by itself.

N. J., Hackensack—SWIMMING POOL—Maple Springs Corp., F. A. Buono, 95 Main St., swimming pool in sand pit, incl. excavating, grading, concrete walls, purifying equipment, swimming pool apparatus, and locker buildings, east side of Hackensack Ave. north of Route 4, day labor, $25,000. Private plans, W. G. Bartels, 270 Main St., archt. Noted June 22.

N. J., Hanover—CEMETERY—Restland Memorial Park, c/o A. Mertin, archt., 34 West 28th St. New York, opening, developing tract of land for cemetery, incl. grading, landscaping, administration building, chapel and carillon tower, to Hegeman-Harris, Inc., 360 Madison Ave., New York. Est. $200,000.

†Okla., Fort Sill—HANGAR—Con. Q.M., brick, steel, concrete work to make 1 story, 120x243 ft. hangar fireproof to U. S. Gypsum Co., 300 West Adams St., Chicago, Ill., $3,710.

Pennsylvania—CAMPS, etc.—State, Dpt. Forests & Waters, Harrisburg, constructing camps,

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†Federal Government.

Unclassified (Continued)
incl. barracks, mess halls, warehouses for 21 state reforestation camps throughout Potter, Centre, Clinton, Jefferson, Clearfield, Forest, Somerset, Clarion, Perry, Adams and Cameron Counties, day labor.

Pennsylvania—RAILWAYS—L. E. Staley, chn. Water Power & Resources Bd., Harrisburg, relocating 2 mi. Pennsylvania R.R. tracks and highway across Pymatuning Reservoir, south of Linesville, to Bates & Rodgers Constr. Co., 338 East Ohio Gas Bldg., Cleveland, O., $207,152. Noted June 8.

R. I., Providence—COURT YARD, etc.—Jackson, Robertson & Adams, 1216 Turks Head Bldg., court yard garden and concrete pool, to A. W. Merchant, Inc., 728 Hospital Trust Bldg., for Rhode Island School of Design, 11 Waterman St. Est. exceeds $17,750. Awarded June 23.

N. B., Chatham—RAILWAY WHARF—Dpt. P. Wks., Ottawa, Ont., constructing new railway wharf, to H. W. Price, Moncton, $30,000. Awarded June 21.

MATERIALS AND EQUIPMENT

PROPOSED WORK

CAST IRON PIPE—Walnut Park, Calif.—Walnut Park Mutual Water Co., 7216 Seville Ave., Huntington Park, L. H. Hamilton, pres., and mgr., will purchase 8,000 ft. 6 in. c.i. pipe for extensions to water system during coming year. Est. $6,000. J. B. Lippincott, 714 West 10th St., Los Angeles, engr.

GATE VALVES—Los Angeles, Calif.—City, A. J. Holm, purch. agt., City Hall, rejected bids gate valves under Spec. 3094 to Water & Power Dpt.

ROAD OIL—Jackson, Minn.—Jackson Co. Road Bd. cancelled bids to have been opened June 20, 25,455 gal. road oil No. 1; 25,455 gal. road oil No. 2; applying 50,190 gal. road oil. Noted June 15.

CHLORINATOR EQUIPMENT — Englewood, N. J.—Bd. Educ., 11 Engle St., plans furnishing, installing chlorinating equipment for purification of water of high school swimming pool, $1,000. **Maturity indefinite.** Engineer not appointed.

SAND, SEWER BRICK, etc.—Cleveland, O.—City soon takes bids 1,000 tons Pelee Island sand, 300 tons brick sand, 700 tons washed concrete sand, 5,500 bbl. portland cement in paper sacks, 800 lb. portland cement in cloth, 1,000 tons crushed stone, 122,000 standard clay brick, 92,000 standard shale sewer brick, 1,500 tons cinders, 1,000 tons slag, 11,050 ft. sewer pipe.

WATER WHEELS, etc.—Seguin, Tex.—City, c/o M. Starcke, mayor, plans new water wheels, generators at Sequin Light and Power Plant. H. N. Tuley, Sequin, engr. Noted June 22.

BIDS ASKED

TOWERS, etc.—Los Angeles, Calif.—July 14, by A. J. Holm, city purch. agt., City Hall, towers, stubs, special towers, extensions, templates, etc. for construction of transmission line from Los Angeles to Colorado River.

SEWAGE PLANT EQUIPMENT—Palo Alto, Calif.—July 5, by City Council, skimming and sludge removal apparatus for sedimentation tank in connection with new sewage disposal plant.

†**BRASS, BRONZE, etc.—Wash., D. C.**—July 5, by Bureau Supplies & Accounts, Navy Dpt., Wash., D. C., brass, bronze, copper, steel bars and shapes, engine driven generator equipment, chain hoists, magnesia pipe covering, asbestos paper, electric motor and speed reducer units, draft gages, goggle frames, corrugated fiber boxes, etc., to Navy Yard, Brooklyn, N. Y.

PORTLAND CEMENT—Chicago, Ill.—July 5, by Dpt. P. Wks., City Hall, 97,000 bbl. portland cement in bulk required by Bureau of Eng. for Chicago Ave. Lake and Land Tunnel, delivered by truck and rail. M. B. Reynolds, city engr.

WATER PIPE, etc.—Chicago, Ill.—July 7, by City, City Hall, 855 tons 8 in. c.i. water pipe f.o.b. cars at various city pipe yards; July 6, 5 tons jute packing for c.i. water pipe. M. B. Reynolds, city engr.

AGGREGATE, GRAVEL or SLAG—Indiana—July 5, by J. D. Adams, chn. State Hy. Comn., Indianapolis, 250-500 tons crushed aggregate or gravel shipped f.o.b. Ockley; 250-500 tons f.o.b. Buck Creek; 800-2,000 tons f.o.b. Delphi; 250-500 tons, f.o.b. Owasco; 1,500-2,000 tons crushed aggregate, gravel or slag, vicinity Brookville or Scipio; 800-1,200 tons, vicinity Vevey; 200-300 tons f.o.b. Delphi; 120 ft. farm drain tile f.o.b. Indianapolis; 200 oil drum pumps, f.o.b. Indianapolis.

AGGREGATE or GRAVEL—Indiana—July 5, by J. D. Adams, chn., State Hy. Comn., Indianapolis, 250-500 tons size 3F and 3G, crushed aggregate or gravel shipped f.o.b. Reynolds; 250-500 tons, f.o.b. Seafield; 200-400 tons, f.o.b. Burnettsville; 250-500 tons sized, f.o.b. Chalmers; 700-800 tons, f.o.b. Monticello; 300-1,000 tons sizes 6 and 46, Rossville; 1,600-2,500 tons vicinity Troy and Cannelton Ferry.

RIP RAP STONE, etc.—Indiana—July 3, by J. D. Adams, chn. State Hy. Comn., Indianapolis, 300-500 tons rip rap stone f.o.b. Seymour*** 3,500-4,000 tons size 46 crushed aggregate in vicinity of Bloomington***75-125 tons No. 5 limestone or slag screenings f.o.b. Rensselaer*** 75-150 tons sand, vicinity Vincennes; 476 ft. corrugated metal culvert pipe f.o.b. Coalmont*** 2,000-3,000 tons sizes 6 and 46, crushed aggregate and gravel, f.o.b. Clinton and Hillsdale*** 155 ft. corrugated metal culvert pipe, f.o.b. Rensselaer***300-425 tons concrete aggregate f.o.b. Centerville and Cambridge City***370 ft. corrugated metal pipe, f.o.b. Fowler; 1,500-2,000 tons sizes 1, 3, 6, and 46 crushed aggregate in vicinity of Spencer.

TELFORD STONE, etc.—Indiana—July 6, by J. D. Adams, chn. State Hy. Comn., Indianapolis, 1,400-2,000 tons Telford stone on Road 262 between Dillsboro and Rising Sun; 1,300-1,800 tons sizes 6 and 46 gravel, in vicinity Petersburg and Vincennes; 500-1,500 tons sizes 46 and 6 crushed aggregate or gravel f.o.b. Sedalia; 182 structural steel plates and 336 machine bolts shipped f.o.b. Rockford.

SCRAPERS, etc.—Evansville, Ind.—July 3, by Bd. Comrs. Vanderburgh Co., H. Schornhorst, comr., three 1-yd. scrapers, 1 tractor, 1 wheel grader, 1 road rooter.

ROAD OIL, etc.—Huntington, Ind.—July 5, by Bd. Comrs. Huntington Co., N. F. Brown, aud., heavy asphalt road oil, tank carlots; cut back asphalt tank cars and barrels, road tar, car load lots; also bids for applying asphalt to roads.

CRUSHED AGGREGATE or GRAVEL—Indianapolis, Ind.—July 1, by State Hy. Comn., J. D. Adams, chn., 1,20-1,800 tons size 4, crushed aggregate or gravel.

SHOULDERS MAINTAINERS — Indianapolis, Ind.—July 1, by State Hy. Comn., J. D. Adams, chn., 6-10 hydraulically operated shoulder maintainers.

BRIDGE LUMBER—Ames, Ia.—July 5, by State Hy. Comn., 19 carloads standard sawed Douglas fir bridge lumber and baffle plank. W. H. Root, maintenance engr.

MOWERS, etc.—Ames, Ia.—July 6, by State Hy. Comn., 27 rubber tired mowers and 4 tar kettles. W. H. Root, maintenance engr.

SNOW FENCE—Ames, Ia.—July 5, by State Hy. Comn., 68,000 lin.ft. slat snow fence, 8,540 ft. 6½ ft. steel posts, and 300 bundles of wire ties. W. H. Root, maintenance engr.

†**ASPHALT CARS—New Orleans, La.**—U. S. Eng., New Orleans, taking bids 4 electrically propelled 2 ton capacity asphalt cars. (Date not set.)

AIR REGULATOR OPERATING MECHANISMS—Boston, Mass.—July 6, by City, Transit Dpt., E. F. Condon, secy., T. F. Sullivan, chn., 1 Beacon St., air regulator operating mechanisms for East Boston Traffic Tunnel. To exceed $1,000.

CATCH BASIN CLEANING MACHINES—Boston, Mass.—July 5, by City, P. Wks. Dpt., J. A. Rourke, comr., City Hall Annex, 2 catch basin cleaning machines to P. Wks. Dpt. Sewer Serv.

METERS—Boston, Mass.—July 6, by City, Supply Dpt., P. A. Chapman, supt., City Hall Annex, bright water meters to P. Wks. Dpt., Water Serv., 2,500 pcs. ¾ in., 500 pcs. 1 in., 50 pcs. 1 in., 50 pcs. 1¼ in., 5 pcs. 2 in. 10 pcs. 3 in., 10 pcs. 4 in.

†**STEEL BARS, etc.—Boston, Mass.**—July 5, by Bureau Supplies & Accounts, Navy Dpt., Wash., D. C., several tons steel bars and shapes to Boston Navy Yard.

BOILER, etc.—East Boston, Mass.—Central Equipment Co., 322 Border St., in market one 66 in. diam. Mass. standard vertical tubular boiler, one ½ yd. gasoline operated shovel; one 40 to 50 ft. steel crane boom.

TRUCK—Anoka, Minn.—July 10, by E. A. Carlson, aud. Anoka Co., one 4-wheel drive truck.

SULPHATE OF ALUMINA — Minneapolis, Minn.—July 10, by F. S. Cram, city purch. agt., 5,000 tons sulphate alumina for filtration plant, F. T. Paul, city engr.

POWER TRACTOR—Wadena, Minn.—July 10, by E. Boss, aud. Waden Co., 70-75 hp. tractor.

PILING and LUMBER—Greenwood, Miss.—July 3, by Supervs. Leflore Co., creosoted piling and lumber and untreated lumber for building bridge over Blue Lake at Berclair.

ASPHALT, ROAD OILS, etc.—Jackson, Miss.—July 6, by State Hy. Comn., Jackson, E. D. Kenna, dir., Standard Life Bldg., furnishing supply of asphalt, road oils and tars required for use of Mississippi Hy. Comn., from July 26, 1993, to Dec. 31, 1933, $15,000; also treated lumber and piling required from July 26, 1933, to Dec. 31, 1933, $10,000.

†**PUMP PARTS, etc.—St. Louis, Mo.**—U. S. Eng. taking bids spare pump parts, miscellaneous spart parts, for Dredges Ste. Genevieve and Grafton. (Date not set.)

ASPHALTIC MACADAM BINDER — St. George, N. Y.—July 5, by J. A. Lynch, pres., Richmond Boro, Boro Hall, furnishing, applying 50,000 gal. asphaltic macadam binder on streets as directed.

REFRIGERATION EQUIPMENT — Wingdale, N. Y.—July 12, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, refrigeration equipment, milk house, at Harlem Valley State Hospital, Spec. 7610.

PIPE—Austin, Tex.—July 5, by State Bd. Control, C. Teer, chn., furnishing State Eleemosynary and Education Institutions and departments for 6 months and 12 months, beginning Sept. 1, 1933, 60,200 ft. ¼- to 8-in. black standard pipe; 22,160 ft. ¼- to 4-in. pipe black, extra strong; 77,550 ft. ¼- to 4-in. pipe, galvanized, standard; 1,910 ft. 1¼- to 4-in. lead pipe; 4,785 ft. standard soil pipe; 2,060 ft. extra heavy soil pipe.

STRUCTURAL STEEL — Houston, Tex. — Southern Pacific Line, c/o R. W. Barnes, ch. engr., Southern Pacific Bldg., taking bids 1,000 tons structural steel.

†**LUMBER—Huntington, W. Va.**—July 3, by U. S. Eng., lumber for Ohio River Locks 14 to 20 (inclusive).

PIPE—Arnprior, Ont.—G. H. Mahes, town clk., taking bids 2,000 ft. 18- to 36-in. concrete pipe.

LUMBER and SAW MILL MACHINERY—Campbell's Bay, Ont.—Smith Bros. in market lumber and saw mill machinery.

CONTRACTS AWARDED

AUTOMATIC CONTROLS, etc.—Los Angeles, Calif.—Metropolitan Water Dist., 306 West 3rd St., S. A. Joseph, purch. agt., automatic controls, Bid 11017, to General Electric Co., 5201 Santa Fe Ave., $2,785***copper cable, Bid 11177, to General Electric Supply Co., 385 East 2nd St., f.o.b. Los Angeles, $9,783, or f.o.b. Colton, $9,775***steel rail, Bid 10988, to United Commercial Co., 837 East Gage Ave., $7,500***pipe, Bid 11362, to Southern Pipe & Casing Co., f.o.b. manufacturing plant, $4,140 or f.o.b. Indio, $4,260. Grand total $24,200.

LUMBER—Los Angeles, Calif.—City, A. J. Holm, city purch. agt., City Hall, furnishing, delivering f.o.b. city construction service yard, Griffith Park, 8 lb. empty cell pressure creosoted lumber, involving 27,000 ft. B.M. 2x12 in. rough common Douglas Fir (structural) random lengths above 16 ft. and 6,000 ft. B.M. 4x4 in. x 6 ft. same, to Patten-Blinn Lumber Co., 521 East 5th St., $1,353.

PIPE—Los Angeles, Calif.—Los Angeles Co., H. E. Russell, purch. agt., Hall of Records, to United Concrete Pipe Co., 1347 West 208th St., furnishing 1,450 lin.ft. 108 in. rein.-con. pipe to contain 25% more circumferential reinforcing steel than that known as heavy reinforcement, also ¾ in. circular rod in both bell and spigot end, at $21.67 per ft.; to American Concrete & Steel Pipe Co., 4635 Firestone Blvd., Southgate, 2,400 ft. 96 in. rein.-con. pipe, heavy, at $16.50 per ft.; 1,400 ft. 102 in. extra heavy at $17.30 per ft.; 1,263 ft. 63 in. centrifugally spun rein.-con. pipe (1200-D) at $8.55 per ft.

STORAGE TANKS, etc.—Oakland, Calif.—East Bay Municipal Utility Dist., 512-16 St., 2 steel storage tanks, 120,000 gal. capacity, to Calif. Steel Products Co., 452 Bay St., San Francisco, $1,627 each***concrete meter boxes and covers to Art Concrete Works, 24th and Adeline Sts., $3,500***concrete meter boxes and covers, to Forni Mfg. Co., 1379-62nd St., $412. Grand total $5,539.

CONVEYORS, etc. — Pasadena, Calif. — City Directors, twin conveyors at city incinerator plant to supply waste materials for fuel at 2 waste heat boiler furnaces, to Link-Belt Co. (Pacific Div.), 365 South Anderson St., Los Angeles, $9,800; air-cooled suspended arches and air-cooled suspended walls in connection with municipal incinerator at municipal light and power plant, to Standard Arch Co., Frostburg, Md., represented by St. Louis Fire Brick Co., 3050 East Slauson Ave., Huntington Park, $9,220. Awarded June 21.

GATE VALVE, etc.—San Francisco, Calif.—T. A. Brooks, city purch. agt., one 30 in. double disc gate valve for Hetch Hetchy Municipal Water Project, Bid 1011, to Chapman Valve Mfg. Co., 508-4th St., $854; 300 brass hydrants for Park & Recreation Depts., Bid 1010, to Pacific Brass Fdry. Co., 528 Folsom St., at 98c. each.

CAST IRON PIPE—South Pasadena, Calif.—City, 5,000 ft. 10 in. Class 150 c.i. water pipe, to Utilities Supply Co., 1840 East 15th St., Los Angeles, at 89.5c. per ft.

ASPHALT—Hartford, Conn.—City, Bd. Contr. & Supply, 60,000 gal. emulsified asphalt to Street Dpt., to Trimount Oil Co., Everett, $5,727. Est. $7,000. **Noted May 18.**

ROAD OIL—Belleville, Ill.—St. Clair Co., B. C. McCurdy, supt. hys., furnishing, applying 400,000 gal. Classes E2 and E3 road oil, to East St. Louis Gasoline Co., Spivey Bldg., East St. Louis, at 3.92c. per gal. Rejected bids June 6, furnishing 15,000 lb. Classes 1, 2 and 4 and 40,000 lb. Classes 3 and 5 corrugated iron culvert pipe.

GATE VALVES, etc.—Chicago, Ill.—Dpt. P. Wks., City Hall, 20, 24 and 36 in. gate valves, to Columbian Iron Wks., Chattanooga, Tenn., $10,012***10,000 bronze bolts, 10,000 brass washers and 10,000 brass nuts, to Lee Bros., Fdry. Co., Anniston, Ala., $754***plumbers solder, to National Lead Co. and to Eagle Picher Co., 4401 South Western Ave., at $1,600 each ***four thousand ¾ and 1 in. bronze gate valves, to Weil McLain, 641 West Lake St., $1,870. Grand total $15,836.

SPECIAL CASTINGS, LEAD PIPE, etc.—Chicago, Ill.—Dpt. P. Wks., City Hall, 11 tons 36 in. standard special castings, to Bessemer Fdry. & Machine Co., 208 South LaSalle St., at $78.75 per ton total $866***20,000 lb. ¼- to 2-in. lead pipe, 10,000 lb. to Miller Supply Co., 2100 South Sawyer Ave., at 4.75c. per lb.

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†*Federal Government.*

Materials, etc. (Continued)

total $2,375, and 10,000 lb. to **Eagle Picher Lead Co.**, 4401 South Western Ave., at 4.75c. per lb. total $2,375***985 tons 12 in. c.i. water pipe, to Glamorgan Pipe & Fdry. Co., 122 South Michigan Ave., at $37.80 per ton total $37,233 ***372 tons 36 in. c.i. water pipe, to U. S. Pipe & Fdry. Co., 122 South Michigan Ave., $35.30 per ton total $13,132***500 Chicago standard fire hydrants, to Kennedy Valve Mfg. Co., 1306 South Canal St., $34.90 each total $17,450. Grand total $73,431. Noted May 18.

CEMENT—**Springfield, Ill.**—State Hy. Dpt., 2,000,000 bbl. portland cement, to Marquette Cement Co., Oglesby, at $1.44 per bbl.

CRUSHED AGGREGATE—**Indianapolis, Ind.**—State Hy. Comn., J. D. Adams, chn., 2,000 tons crushed aggregate on Road 60, Lipsic, to Indiana State Farm, Putnamville, $2,900*** 2,000 tons on Rd. 145, Birdseye, to Hy-Rock Products Co., Evansville, $2,700***1,000 tons Rd. 145, French Lick, to Dixon Stone Co., French Lick, $1,360. Grand total $6,960.

GRAVEL and AGGREGATE—**Indianapolis, Ind.**—State Hy. Comn., to Western Indiana Gravel Co., Lafayette, 500 tons gravel at Montmorenci, $575; 1,000 tons at Rossville $1,260; 5,500 tons at Waveland, $7,700***to G. Worrell, Petersville, 1,200 tons at Columbus, $996***to Monon Crushed Stone Co., Monon, 900 tons crushed aggregate at LaCrosse and Wilders $1,079; 2,500 tons at Gadsen, $3,625 ***to Moulding Brownell Corp., 165 West Wacker Dr., Chicago, Ill., 1,000 tons at St. John $1,150***to Newton County Stone Co., Kentland, 6,000 tons at Fowler $7,020***to Lehigh Stone Co., Kankakee, Ill., 1,000 tons at Wheatfield, $1,150. Grand total $24,555. To Ault & Son Lumber Co., Tipton, lumber at Tipton, at $25 per 1,000 ft. Noted May 25 and June 1.

CRUSHED AGGREGATE, etc.—**Indianapolis, Ind.**—State Hy. Comn., to Erie Stone Co., 410 Illinois Bldg., 3,300 tons crushed aggregate at Andrews, $5,247***to Moulding Brownell Corp., 165 West Wacker Dr., Chicago, Ill., 1,950 tons at Dinwiddie, $2,945; 1,950 tons at Crown Point $2,652***to Monon Crushed Stone Co., Monon, 600 tons at Westville, $756; 500 tons at Battle Ground, $555; 1,900 tons at Lacrosse, $3,174; 3,000 tons at Medaryville, $4,380***to Rockledge Stone Co., Portland, 400 tons at Portland, $420***to W. C. Babcock Constr. Co., Rensselaer, 1,000 tons at Roselawn, $1,470***to France Stone Co., 2nd Natl. Bank Bldg., Toledo, O., 3,000 tons at Bourbon, $3,780; 1,000 tons slag at Porter, $1,360***to Lenahan Konen Gravel Co., Vincennes, 1,500 cu.yd. gravel at Vincennes, $1,110***to Western Indiana Gravel Co., Lafayette, 500 tons at Ash Grove, $590*** to Concrete Materials Corp., 2104 Miner St., Fort Wayne, 4,800 tons at Roana $6,720***to Connersville Gravel Co., Connersville, 1,500 tons at Laurel, $1,410. Grand total $36,569. Noted June 8.

REINFORCING STEEL — **Bedford, Ia.** — Bd. Comrs. Taylor Co. 35 tons reinforcing steel, to Des Moines Steel Co., 421 Southwest 4th St., Des Moines, $1,551. Awarded June 20.

BRIDGE LUMBER — **Garner, Ia.** — Hancock Co., 1 car treated and 1 car untreated lumber, to Wheeler Lumber, Bridge & Supply Co., Hubbell Bldg., Des Moines, $2,257. Awarded June 22. Noted June 15.

STEEL—**Sioux City, Ia.**—Woodbury Co., 102,064 lb. structural steel for one 18x70 ft. and one 70x16 ft. pony truss bridge with I-beam approach spans, to E. S. Gaynor, Sioux City, $3,279. Awarded June 19. Noted June 15.

REINFORCED CONCRETE PIPE—**Spencer, Ia.**—Bd. Supervs. Clay Co., 1,196 lin.ft. 24- to 48-in. roadway culvert pipe, to Wilson Concrete Co., Humboldt, $2,389; 1,400 lin. ft. 15- to 24-in. entrance culvert pipe, to Spencer Cement Block Wks., Spencer, $826. Awarded June 22.

BOILERS, etc.—**Beloit, Kan.**—Girls Industrial School, c/o State Bd. Administration, N. Franklin, bus. mgr., State House, Topeka, 2 new 100 hp. boilers and piping, to Clark & Smith, Sedgwick Bldg., Wichita, $9,193.

GRAVEL FILL—**Boston, Mass.**—City, T. F. Sullivan, chn. Transit Dpt., 1 Beacon St., furnishing 7,000 cu.yd. gravel fill for East Boston Traffic Tunnel, to F. L. Trainor, 121 Boston St., South Boston, $4,060. Awarded June 22. Noted June 15.

PLANKING—**Boston, Mass.**—City, P. A. Chapman, supt. Supply Dpt., City Hall Annex, furnishing 20 M. ft. merchantable creosoted spruce planking, to Geo. McQuesten Co., 422 Border St., East Boston, $1,456. Awarded June 20.

ASPHALTIC ROAD OIL, etc.—**Westfield, Mass.**—City Bd. P. Wks., City Hall, road oil, applied, to Mace Moulton, Jr., Westfield, 7.23c. per gal. and to Standard Oil Co. of New York, 31 St. James Ave., Boston, 8.44c. per gal.

ROAD OIL, etc.—**Hutchinson, Minn.**—City, 50,000 gal. road oil and 30,000 gal. cutback asphalt, to J. W. Craig Co., 1825 Northeast Grand St., Minneapolis, at 6.49c. and 8.94c. per gal. respectively.

PIPE—**Minneapolis, Minn.**—City, 2,600 lin.ft. 16 in. c.i. water pipe (monocast), to Amer. Cast Iron Pipe Co., 712 Plymouth Bldg., at $2.26 per lin.ft. Noted June 8.

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MOTOR DRIVEN PUMP—**St. Peter, Minn.**—City, furnishing, installing 1 motor driven pump, to Fairbanks, Morse & Co., Park Sq., St. Paul, $2,608. Noted June 15.

CRUSHED STONE—**Ferguson, Mo.**—City, 40 tons crushed stone, to Tower Grove Quarry & Constr. Co., 5926 Scanlan Ave., St. Louis, at $1.55 per ton delivered***5 cars cinders (50-ton cars), to H. Rolwes, Dade and Abston Aves., $38 per car***40,000 gal. road oil furnished and applied on streets, to Missouri Petroleum Products Co., 1101 Ambassador Bldg., St. Louis, 4.48c. per gal. Grand total $2,044.

TANKS—**Helena, Mont.**—State, J. E. Murphy, purch. agt., 2 steel water tanks, one for state hospital and other for state prison, to Great Falls Iron Wks., Great Falls, $11,370.

†CEMENT—**Boulder City, Nev.**—Bureau Reclamation, Denver, Colo., 400,000 bbl. portland cement for Boulder Dam, Spec. 591-D, to California Portland Cement Co., Pacific Mutual Bldg.; Monolith Portland Cement Co., 215 West 7th St., Southwestern Portland Cement Co., 727 West 7th St.; Riverside Cement Co., 621 South Hope St., all Los Angeles, Calif. at $1.40 per bbl., total $560,000.

ASPHALT ROAD OIL—**Brooklyn, N. Y.**—H. Hesterberg, pres. Brooklyn Boro, Boro Hall, 150,000 gal. asphalt road oil for cold application, to Warner Quinlan Co., 2 Park Ave., New York, at 4.86c. per gal., total $7,290. Noted June 8.

WIRE ROPE—**New York, N. Y.**—M. F. Kenney, comr. Purchase, Municipal Bldg., wire rope to Dpt. Sanitation, to Wire Rope Corp. of America, 105 Hudson St., $5,010. Noted June 8.

BITUMINOUS CONCRETE—**St. George, N. Y.**—J. A. Lynch, pres. Richmond Boro, Boro Hall, 500 tons bituminous concrete, to Road Material Co., 17 State St., New York, $7 per ton, total $3,500. Noted June 8.

RAILS—**Norfolk, Va.**—Norfolk & Western R.R. Co., W. P. Wiltsee, ch. engr., Roanoke, 7,500 tons rails, to Carnegie Steel Co., 71 Bway., New York, and Carnegie Bldg., Pittsburgh, Pa.; 2,500 tons, to Bethlehem Steel Co., Bethlehem, Pa.

RAILS—**Richmond, Va.**—Southern Railway Co., B. Herman, ch. engr., McPherson Sq., Wash., D. C., 1,200 tons rails, to Tennessee Coal, Iron & R.R. Co., 71 Bway., New York.

FITTINGS, etc.—**Cheyenne, Wyo.**—City, 1 ton c.i. special fittings, 2,400 lb. pig lead, and 100 lb. jute, to Pacific States Cast Iron Pipe Co., Spaulding Bldg., Portland, Ore., $3,077.

LIME and CHLORINE—**Ottawa, Ont.**—Secretary Bd. Control, 10,000 tons liquid chlorine for filtration plant at Lemieux Island, to Canadian Industries Ltd., Windsor, at $10.20 per ton. Awarded June 12. Noted June 8.

FOREIGN

Australia, Melbourne—Sept. 12, by Dept. Director Posts & Telegraphs, supply and delivery automatic switching equipment and automatic telegraph equipment for use in rural areas.

British South Africa, Johannesburg—Municipality plans municipal electric light plant addition. $500,000.

Denmark, Copenhagen—Harvey & Jarvis, Jens Kofodsgade 4, Copenhagen, in market waterworks and sewerage disposal equipment.

England, Dagenham—May & Baker, Ltd., Battersea, England, plans chemical plant, $150,000 or more.

England, Wirral, Lancashire—Bids about July, arterial road. $2,000,000. Ministry of Transport promised to provide 75% of cost.

Japan, Ube—Ube Chisso Kogyo Kaisha Ltd., c/o Y. Walanabe, Ube, Oita-Ken, plans ammonium sulphate plant, 50,000 tons annual capacity.

Manchuria, Mukden—Corporation, c/o Manchurian Paint Co., Dairen, Manchuria, plans paint and varnish works. To exceed $100,000.

PUBLIC BUILDINGS

PROPOSED WORK

Calif., Bakersfield—Bd. Supervs. Kern Co. tentative plans made by C. H. Biggar, 554 Haberfelde Bldg., library building, 17th and K Sts., $250,000. Application made to Government for loan from P. Wks. fund.

Calif., Bakersfield—Kern Co. tentative plans made by C. H. Biggar, 554 Haberfelde Bldg., plans addition to Kern County Hospital to be financed by government from P. Wks. fund. Application has been made to Government for loan of $250,000.

Calif., Long Beach—Long Beach City School Dist. will vote bonds or finance construction via Reconstruction Finance Corp. funds to rehabilitate all schools in city (considerable damage done to city schools in recent earthquake).

†**Kan., Leavenworth** — Vet. Bu., Arlington Bldg., Wash., D. C., rejected bids Feb. 28, 1 story, basement, 32x35 ft., brick, concrete kitchen unit addition to nurses home, at U. S. Veterans Administration Home. Noted Feb. 2.

Ky., Catlettsburg—Municipality plans electric power plant. To exceed $40,000.

†**Mass., Cambridge**—Treas. Dpt. at office Sup. Archt., Wash., D. C., rejected bids Mar. 28, 2 story, basement, 97x156 ft. U.S. Post Office. Will readvertise. Noted Mar. 2.

†**Neb., Lincoln**—Vet. Bu., Arlington Bldg., Wash., D. C., rejected bids Mar. 7, 4 story, 32x42 ft., rein.-con., brick, stone addition to Main Building 1, at U. S. Veterans Hospital. Noted Feb. 9.

†**N. J., Fort Monmouth**—Con. Q.M., rejected bids June 7, constructing band barracks, $105,000 incl. equipment. **Maturity indefinite.** Noted May 18.

†**N. Y., Fort Jay**—Con. Q.M., rejected bids May 17, non-commissioned officers quarters. Noted May 25.

†**Okla., Fort Sill**—Con. Q.M., rejected bids Apr. 28, 3 story, 95x114 ft., rein.-con., stone, tile Unit D of field artillery barracks, also thirty-five 1 story hollow tile, stucco garages. Noted May 25.

Tenn., Knoxville—City, F. Dobson, chn. Jail Com., plans 14 story jail. Hamilton Co. will make application to Reconstruction Finance Corp. for $350,000 loan to construct above building, which in excess fees will pay for itself in 25 years. Architect not appointed.

Tenn., Knoxville—N. Bass, city mgr., making application to Reconstruction Finance Corp. for $180,000 loan to construct school.

Tex., Austin—City, c/o J. G. Morgan, mgr., plans under Federal P. Wks. Programme, service building to power plant, $150,000; public market building, $52,500; nurses home adjacent to Brackenridge Hospital, $31,500.

Tex., Laredo—City filed application with P. Wks. Bd. (Government), for funds to construct auditorium, $200,000; and municipal market building, $100,000.

Tex., San Antonio—See "Unclassified."

Tex., San Antonio—City, c/o C. K. Quin, mayor, filed papers for loan through P. Wks. plan of Government for construction of market house. $375,000. I. Ewig, city engr.

Tex., San Antonio—City, c/o C. K. Quin, mayor, made application to P. Wks. Bd. for financing construction of armory. $500,000. I. Ewig, city engr.

Tex., San Antonio—City made application to P. Wks. (Federal) Board for financing construction of mausoleum at San Jose Burial Park. $250,000. I. Ewig, city engr.

†**Tex., San Antonio**—U. S. Eng., San Antonio, plans barracks, office, quarters, warehouses, hangars, etc., for various posts near here. $8,000,000. Funds included in Public Wks. Program.

Tex., Seguin—Guadalupe Co., c/o H. A. Heideke, judge, made application to Bd. P. Wks. Act for financing construction of county courthouse and jail. $200,000.

Utah, Ogden—Bd. Educ., c/o F. M. Nye, member City School Bd., plans school. $600,000. Loan sought from Reconstruction Finance Corp. Sponsored by City School Bd. and Ogden Chamber of Commerce.

Utah, Ogden—Weber Co., c/o County Clerk, plans city and county building. $500,000. Reconstruction Finance Corp. loan sought.

Utah, Price—Carbon Co., c/o County Clerk, plans hospital. $110,000. Reconstruction Finance Corp. loan sought.

Wis., Madison—City, J. R. Law, mayor, plans city hall. $250,000. Architect not appointed.

BIDS ASKED

†**Calif., North Hollywood**—July 28, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office adv. E.N.-R. June 29.

Calif., San Francisco—Aug. 16 (extended date), by S. J. Hester, secy. Dpt. P. Wks., 5 story, basement, Class "A" steel frame, rein.-con. psychopathic building, Potrero Ave., for City and San Francisco Co. Noted Apr. 20.

†**Calif., Visalia**—July 12, by Treas. Dpt. at office Sup. Archt., Wash., D. C., interior lighting fixtures.

†**Conn., Meriden**—July 14, by Treas. Dpt. at office Sup. Archt., Wash., D. C., freight elevator in extension and remodeling U. S. Post Office.

†**Conn., Waterbury**—July 7, by Treas. Dpt. at office Sup. Archt., Wash., D. C., interior lighting fixtures.

†**Fla., Tallahassee**—July 7, by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office. Noted June 15.

†**Fla., Winter Haven**—July 19, by Treas. Dpt. at office Sup. Archt., Wash., D. C., U .S. Post Office. Noted June 15.

†**Ind., Wabash**—July 17, by Treas. Dpt. at office Sup. Archt., Wash., D. C., repairing mechanical equipment at U. S. Post Office.

†**Ky., Owensboro**—July 14, by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office and Courthouse; adv. E.N.-R. June 29.

Minn., Owatonna—July 11, by Dpt. Administration & Finance, 120 State Capitol, St. Paul, 2 story, basement, brick, steel school, $100,000, remodeling old school building, $15,000, both at State School for Indigent Children. Larson & MacLaren, 308 Baker Bldg., Minneapolis, archts.

†**N. J., Dover**—July 18, by Treas. Dpt. at office Sup. Archt., Wash., D. C., 1 story, basement, brick, limestone, steel post office, plain found., North Sussex St. $140,000. Noted Nov. 3.

†*Federal Government.*

Public Buildings (Continued)

N. Y., Attica—July 6, by Commissioner Correction, State Office Bldg., Albany, miscellaneous additional work for State Prison, Spec. 7663.

N. Y., Buffalo—July 10, by W. Rathmann, comr. P. Wks., City Hall, constructing new police headquarters, building, incl. heating, electrical work, plumbing, steel cells, sidewalks, paving, etc., Franklin and Church Sts. $800,000. Former bids rejected.

N. Y., Rome—July 19, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, electric elevator, bake shop, Rome State School, Spec. 7647.

N. Y., Thiells—July 19, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, electric fixtures, accommodations for inmates, employee accommodations, assembly hall, industrial building, additions to women's service building, to Stewards and Vanderlip Halls, and to Boys' Service Building and tunnels, Letchworth Village, Spec. 7623.

†**N. C., Wilmington**—July 13, by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office, Court House ar Custom House.

†**O., Delphos**—July 14, by Treas. Dpt. at office Sup. Archt., Wash., D. C., interior lighting fixtures.

Pa., Pittsburgh—July 5, by J. Weber, bus. mgr. and superv. engr. University of Pittsburgh, for Heinz Memorial Chapel, 245 ft. to fleche, 57x155 ft., Indiana limestone, on campus, $600,000. Memorial to be built by children of H. J. and Anna Margaretta Heinz. C. Z. Klauder, 1429 Walnut St., Phila., archt. Noted June 2, 1932.

†**S. D., Rapid City**—July 13, by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office.

†**Tenn., South Pittsburg**—July 14, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office. Noted Feb. 23.

†**Tex., Breckenridge**—July 24, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

†**Tex., Pampa**—July 13, by Treas. Dpt. at office Sup. Archt., Wash., D. C., interior lighting fixtures.

†**Tex., Sabine Pass**—July 18, by Treas. Dpt. at office Sup. Archt., Wash., D. C., 3 story, 160x200 ft., brick, stone, rein.-con. quarantine station, plain found. $339,500.

†**Tex., Sequin**—July 21, by Treas. Dpt. at office Sup. Archt., Wash., D. C., U. S. Post Office.

†**Utah, Logan**—July 21, by Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office; adv. E.N.-R. June 29.

CONTRACTS AWARDED

Ark., Russellville — At office J. W. Hull, pres. Arkansas Polytechnic College, general contract brick, concrete men's dormitory, to G. E. Kraus, Clarksville. $62,000***plumbing and heating, to Russellville Plumbing & Heating Co., Russellville, $9,385***electrical work, to Arkansas Electric Co., Little Rock, $2,528. Grand total $73,913. Noted May 25.

D. C., Wash.—District Comrs., District Bldg., installing new heating plants in 4 public schools, to Industrial Piping & Eng. Co., Court Sq. Bldg., Baltimore, Md., $26,535. Noted June 1.

Ind., Bloomington—State Hy. Comn., Indianapolis, 1 story, 50x80 ft., brick, steel, service building for maintenance dpt., to C. E. Cooper, Odon. Noted June 22.

†**Ind., French Lick**—Aetna Casualty & Surety Co., 151 Farmington Ave., Hartford, Conn., completing U. S. Federal Building, to Dunlap & Co., Columbus, for Treas. Dpt. at office Sup. Archt., Wash., D. C. Noted June 8.

†**Mass., Boston**—Treas. Dpt. at office Sup. Archt., Wash., D. C., borings for U. S. Parcel Post Station, Dorchester Ave. and Summer St., to Gow Co., 31 St. James Ave. Total est. $3,000,000. Noted Dec. 22.

Mass., Boston—W. W. Drummey, supt. Constr. Dpt. School Buildings, 11 Beacon St., new boilers in Julia Ward Howe School, Roxbury, to Florence & Co., 20 Leverett St., $3,910***plumbing in Capen School, South Boston, to Pierce & Cox, 143 Kingston St., $7,196***plumbing in Rice School, Dartmouth and Appleton Sts., Boston, to F. J. Murphy, 17 Bway., South Boston, $8,173***plumbing in John Boyle O'Reilly School, South Boston, to Capital Plumbing & Heating Co., 228 Harrison Ave., $8,317 ***electrical work in Thos. N. Hart, and Benjamin Dean Schools, South Boston, to Williams Gens & Son, 80 Stamford St., Boston, $1,584. Grand total $29,180.

Mass., Dedham—Commonwealth of Massachusetts, Norfolk Co. Comrs. Dedham Court House, furnishing oil burning equipment at Norfolk County Jail on Village Ave., to Simplex Oil Heating Corp., 108 Mass Ave., Boston, $3,050. Awarded June 20. Noted June 8.

Mass., East Braintree—C. C. Temple, general contractor, 2 Park Sq., Boston, heating and plumbing for 1 story, basement, 28x62 ft. and 23x84 ft. storage building, to J. E. Ludden, 16 Brookside Rd., Weymouth, for Town of Braintree, Electric Light Dpt., Town Hall, Braintree. Noted May 11, under "Contracts Awarded." Awarded June 15.

†*Federal Government.*

Mass., Swampscott—School Com. at office F. L. Mansur, supt., installing heating and ventilating system in Clarke School, to R. T. Pender, Inc., 33 Sutton St., Lynn, $4,839. Awarded June 16. A. Moller, 27 Haymarket Sq., Boston, engr. Noted May 25.

Minn., Willmar—State Dpt. Administration & Finance, two 2 story, basement, brick, stucco, tile cottages at State Asylum, to C. H. Peterson & Co., 1036 Builders Exch., Minneapolis, $88,678.

†**Mont., Hamilton**—Treas. Dpt. at office Sup. Archt., Wash., D. C., refrigerating equipment for Public Health Service Station, to York Ice Mchy. Corp., 123 North 34th St., Phila., Pa., $11,757.

†**Nev., Reno**—Treas. Dpt. at office Sup. Archt., Wash., D. C., furnishing, installing lighting fixtures in new federal building, to H. A. Framburg & Co., 3320 Carroll Ave., Chicago, Ill., $1,670.

†**N. Y., Brooklyn**—Treas. Dpt. at office Sup. Archt., Wash., D. C., acoustical treatment in U. S. Post Office, to Balaban-Gordon Co., 1457 Bway., New York, $4,562. Noted May 25.

†**W. Va., Point Pleasant**—Treas. Dpt. at office Sup. Archt., Wash., D. C., installing new heating system in U. S. Post Office, to J. L. Powers, Bennettsville, S. C., $2,356. Noted May 11.

COMMERCIAL BUILDINGS

PROPOSED WORK

N. J., Englewood—W. Mezick, Ramapo Rd., Teaneck, plans group 2½ story, basement, brick frame, residences, plain founds., Grand and Broad Aves. $150,000. **Maturity soon.** Architect not appointed.

N. J., Hackensack—Owner, c/o A. E. Dore, archt., 398 Main St., sketches 1 story, basement, brick, steel, granite, limestone, store, plain found., Berry and Main Sts. $105,000.

N. J., Mountain View — Owner, c/o C. H. Weckers, archt., Prospect Ave. making plans 2 story, brick, log beer garden, restaurant, dance hall, plain founds., State Hy. 23. $105,000.

N. J., Newark—W. J. Fitzsimmons, archt., 626 Central Ave., East Orange, soon lets contract 1 story, basement, brick, steel hotel addition, plain found., Lincoln Park, for Lincoln Park Hotel, 1076 Broad St. Est. $105,000 incl. equipment.

N. J., Ridgewood—Fidelity Title & Mortgage Guaranty, W. Harris, in charge, 60 East Ridgewood Ave., sketches, altering and renovating 2 story, basement, brick, steel theater, Wilsey Sq. $150,000 incl. equipment. Private plans. Noted June 8.

N. J., Union—Blue Ribbon Houses, Inc., L. J. Zehnbauer, pres., 998 Stuyvesant Ave., plans group 2½ story, basement, brick veneer, frame residences, plain founds., Indian Run Park. $150,000. **Maturity soon.**

N. J., Union—Owner, c/o E. A. McMurray, archt., Falls Bldg., making plans 2½ story, basement, brick veneer, frame residences, plain found. $150,000.

N. Y., Long Beach—W. Harman, Long Beach, plans group dwellings, Hudson St. and Neptune Ave. To exceed $100,000.

N. Y., New York—Rockefeller Center, Inc., C. O. Heydt, treas., 420 Lexington Ave., plans by Reinhard & Hofmeister, Corbett, Harrison & McMurray and Hood & Foulihoux, 420 Lexington Ave., altering 55 story Rockefeller Center, 1242-1254 6th Ave. $140,000.

N. Y., New York—Wallenstein Constr. Co., 271 Madison Ave., plans by E. Week, 41 East 42nd St., 6 story, 84x100 ft. apartment, Knox Pl. and Mosholu Parkway. $150,000.

BIDS ASKED

N. J., Haworth—H. N. Algire, archt., 230 Engle St., Englewood, taking bids general contract rebuilding 2½ story, basement, brick, frame club house, plain found., Haworth Dr., for White Beeches Golf Club, J. A. Foley, in charge, Haworth Dr. $105,000. Noted June 8.

N. J., Lyndhurst—C. Daiker, archt. and engr., 164 Valley Brook Ave., bids about Aug. 20, general contract altering and constructing 1 story, basement, brick, steel masonic temple addition, plain found., Riverside Ave., for Adoniram Masonic Assn., 318 Riverside Ave. Est. $150,000. Noted Mar. 16.

N. J., Paterson—J. Bellomo, archt., 277 Market St., bids about July 15, general contract altering and constructing 3 story, basement, brick, steel club house, plain found., for Owner, c/o architect. $150,000.

N. Y., Brooklyn—Model F. P. Tenement Co., O. G. Jennings, pres., 111 East 40th St., New York, taking bids on separate contracts 9 story, 61x82 ft. store and apartment, 71st St. and Colonial Rd. $150,000. E. Flagg, 111 East 40th St., New York, archt. Noted June 15.

Tex., Houston—July 10, by Southern Pacific Ry. Co., R. W. Barnes, ch. engr., Southern Pacific Bldg., 4 story, basement, 60x392 ft., brick, stone, steel passenger terminal. W. C. Hedrick, Inc., Sell Bldg., archts. Noted June 22.

CONTRACTS AWARDED

Me., Lewiston—A. F. Smiley Constr. Co., general contractors, 202 Oak Hall, Pawtucket, R. I., electric wiring and fixtures for business block, to C. E. Kerr Electric Co., Auburn, for McGillicuddy Block, J. T. McGillicuddy, 166 Lisbon St. Noted Apr. 6, under "Contracts Awarded."

Mass., Dorchester—St. Brendan's Roman Catholic Church, 597 Gallivan Blvd., Dorchester, 1½ story, basement, irregular sized, Weymouth seam face granite church, to Capobianco Constr. Co., 44 School St., Boston, to exceed $105,000. General contractor awarded excavation, to M. McDonough Co., Bway., Malden. Awarded about June 15. Noted Mar. 2.

N. H., Exeter—Phillips Exeter Academy, general contract Dormitory 7, 4 story, basement, 70x125 ft., brick, stone, concrete found., to L. H. Shattuck, Inc., 208 Granite St., Manchester ***heating, to Buerkel & Co., Inc., 24 Union St., Boston, Mass.***plumbing, to J. S. Cassedy, 133 Austin St., Cambridge, Mass.***electrical work, to Hixon Electric Co., 22 Elkins St., South Boston, Mass. Est. exceeds $150,000. Noted Nov. 17.

N. J., Linden—C. J. Weidl, general contractor, 917 Summit St., electrical work for 2 story, basement, brick church, for St. Paul's Lutheran Church, 409 Ainsworth St., to J. Pencak, 301 West Curtis St. General contractor now taking bids on steel, ornamental iron, lumber and metal work. Total est. $105,000. Noted June 22 under "Contracts Awarded."

N. J., Union—Union-Irvington Development Corp., S. Leatz, pres., 1060 Broad St., Newark, general contract group 1½ story, basement, frame, brick veneer residences with 1 car garage attached, plain founds., Glens and Kelly Sts., to Patent Constr. Co., 641 South 18th St., Irvington. Est. $105,000. M. Kimmel, 45 Branford Pl., Newark, archt.

Pa., Wilkes-Barre—T. Foster, archt., 16 South Franklin St., new Y.M.C.A. Building, Northampton and Franklin Sts., to A. J. Sordoni, Forty Fort, for Wilkes-Barre Y.M.C.A. Est. $500,000. Noted June 8.

Wis., Portage—First Church of Christ Scientist, 2 story, basement, 40x70 ft., steel church, plain found., to Stensrud Co., Oconomowoc. Noted May 25.

Ont., London — O. Roy Moore, archt., 489 Richmond St., 2 story, basement, 50x90 ft., brick addition to Parkwood Hospital, to Hyatt Bros., 290 Egerton St.; heating and plumbing, to Bennett & Wright, 286 King St. Est. $100,000. Noted May 25.

INDUSTRIAL BUILDINGS

PROPOSED WORK

N. J., Bogota—FACTORY—Bogota Paper & Board Co., W. Smith, pres., River Rd., rejected bids 1 story, brick, steel, cinder block, plain found., River Rd. $28,500. **Maturity indefinite.** T. Bon Theim, c/o owner, archt. and engr. Noted Apr. 13.

N. J., Morristown—SUPER SERVICE GAS STATION—Standard Oil Co. of New Jersey, 15 Washington St., Newark, soon lets general contract 1 story, 30x90 ft., brick, stucco, plain found., Pine and Morris Sts. $28,000 incl. equipment. G. L. Rosebrook, 15 Washington St., Newark, archt. Noted Apr. 6.

N. J., Newark—FACTORY—Irving Kent Corp., I. Kent, pres., 1370 Bway., New York, plans brick, plain found. $40,000 incl. equipment. **Maturity indefinite.** Architect not appointed.

N. J., New Brunswick—PAPER MANUFACTURING, etc.—J. Lapolosa, 171 Remsen St., rejected bids 2 story, basement, brick, steel paper manufacturing plant and storage warehouse, plain found., Georges Rd. $40,000. H. G. Bach, 63 Schureman St., archt. Noted May 25.

N. J., North Hackensack—AUTO SERVICE STATION—M. Broadman & F. Stern, c/o F. T. Baker, archt., 790 Bogart Rd., River Edge, rejected bids 1 story, concrete block, stucco, plain found., State Hy. Route 4 and Main St. $28,000 incl. equipment. Noted May 4.

N. J., Perth Amboy—GARAGE—H. Polkowitz, c/o Central Garage, 227 New Brunswick Ave., rejected bids 1 story, brick, plain found., 722 New Brunswick Ave. $40,000. **Maturity indefinite.** M. G. Tuzik, 280 Hobart St., archt. Noted May 18.

N. Y., Brooklyn—AUTO LAUNDRY, etc.—Berk-Lafayette Realty Corp., L. Berkowitz, pres., 51 Madison Ave., bids in October, general and separate contracts auto laundry, service garage and gas station, Bay Parkway and West 11th St. $28,000 with equipment. J. Harrison, 220 East 42nd St., New York, archt.

N. Y., New York—BAKERY—Gottfried Baking Co., 715 11th Ave., plans by H. Ginsberg, 205 East 42nd St., altering bakery, Union Ave. and 165th St. $28,000 with equipment.

N. Y., New York—BREWERY—Flanagan-Nay Brewery, T. J. Lanphier, in charge, or c/o Rabenold & Scribner, 20 Exchange Pl., plans altering and extending brewery and equipment, 10th Ave. and 24th St.

N. Y., New York—SERVICE GARAGE, etc.—Bronxwood Service Station, Inc., plans by M. Glick, 400 East Fordham Rd., altering and extending service garage and gas station, Bronxwood Ave. and 225th St. Est. about $28,000 with equipment.

N. Y., New York—SERVICE GARAGE, etc.—Kapet Holding Corp., 3602 Holland Ave., plans by J. J. Dunningan, 2382 Grand Concourse, service garage, repair station, Gun Hill Rd. and Mickel Ave. Est. $28,000 with equipment.

N. Y., New York—STORAGE—Central Savings Bank, Bway. and 73rd St., rejected bids altering 4 story storage and warehouse, 503 East 82nd St. $28,000. G. S. Kingsley, 103 East 125th St., archt. Project indefinitely in abeyance. Noted Apr. 27.

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Industrial Buildings (Continued)

N. Y., New York—WAREHOUSE—F. H. Beck, 4515 Bronx Blvd., plans by J. P. Boyland, 305 East Kingsbridge Rd., 2 story, 60x69 ft., brick, Bronx Blvd. and 239th St.

N. Y., Schenectady—ICE STORAGE—Janes & Maxwell, Schenectady, plans rebuilding ice storage, Olean St. $28,000 with equipment. **Maturity indefinite.** Architect not appointment.

O., Cincinnati—DAIRY—J. C. Grunkemeyer, archt., 3717 Eastern Ave. soon lets contract 3 story, 65x105 ft., rein.-con., plain found., Paddock Rd., for G. H. Berling, Inc., 4833 Reading Rd.

O., Cleveland — SUBSTATIONS — Cleveland Railway Co., A. C. Kennedy, purch. agt., Midland Bldg., plans 1 story, brick, steel, concrete electric substations. $60,000. L. D. Bale, c/o owner, engr.

O., Toledo—PLANT—Libby-Owens-Ford Glass Co., Nicholas Bldg., making plans 80x350 ft. safety glass plant addition, at East Broadway plant. D. Goodwillie, genl. mgr. $100,000. Private plans.

Okla., Yukon—BREWERY—Yukon Mills Co. sketches made brewery. $100,000.

Tex., Houston — SHIP REPAIR and DRY-DOCK PLANT—Todd Shipyards Corp., J. D. Reilly, pres., 25 Bway., New York, plans large ship repair and drydocking plant, incl. 3 bin piers, 3 big floating dry docks, in Port of Houston. $1,100,000 loan approved by Reconstruction Finance Corp.

Tex., Mission—PACKING PLANT—Lovett & Kirk, San Benito, soon lets contract 2 story, brick, rein.-con. packing plant. Private plans.

Tex., Mission—PLANT—Webb Marketing Co., c/o D. Webb, pres., soon lets contract 2 story, 38x64 ft., brick, rein.-con. juice extraction plant. Private plans.

BIDS ASKED

Calif., San Francisco—BREWERY—See "Contracts Awarded."

Ill., Freeport—GASOLINE SERVICE STATIONS—See "Contracts Awarded."

Ind., Indianapolis—PLANT—See "Contracts Awarded."

Ind., Indianapolis—FACTORY—See "Contracts Awarded."

Ky., Louisville — PLANT — See "Contracts Awarded."

N. J., Asbury Park—STORAGE PLANT—See "Contracts Awarded."

N. J., Irvington—AUTO SERVICE STATION—See "Contracts Awarded."

N. J., Keyport—MARKET—J. A. Rippen, 62 Front St., taking bids general contract 1 story vegetable market and road stand, frame, plain found., State Hy. $28,000 incl. equipment. V. Eck, Zobel Bldg., Red Bank, archt. Noted June 22.

N. J., Little Ferry—FACTORY—See "Contracts Awarded."

N. J., Newark—BREWERY—See "Contracts Awarded."

N. J., Passaic—SERVICE STATION—See "Contracts Awarded."

N. J., Paterson—DYE HOUSE—Columbia Piece Dye Wks., M. Goldstein, in charge, 182 Sheridan Ave., taking bids general contract 1 story, 100x100 ft., brick addition, plain found., Sheridan Ave. $40,000 incl. equipment. J. C. Van Vlandren, 7 South St., Paterson, archt.

N. Y., New York—BOTTLING PLANT—See "Contracts Awarded."

N. C., Weldon—SERVICE REPAIR STATIONS—See "Contracts Awarded."

Pa., Coraopolis—REFINERY—See "Contracts Awarded."

Pa., McKees Rocks—BREWERY—F. F. Bollinger, archt., Duss Ave., Ambridge, taking bids rebuilding, cooling room, also tank room, new parapet walls on top floor, new cooling equipment, at brewery, for First Natl. Brewery, owned by Independent Brewing Co. $50,000.

S. D., Letcher—GARAGE—See "Contracts Awarded."

Ont., Kirkland Lake—MILL—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Oakland—PLANT—Concrete Products Sales Co., Lathan Sq. Bldg., superstructure concrete mixing plant, to J. F. Fattin, 2925 Hillegass St., Berkeley, $5,500; foundations, to A. W. Kitchen, 110 Market St., San Francisco, $9,000. Other contracts incl. equipment to be awarded at later date. Noted June 8.

Calif., San Francisco—BREWERY—El Rey Brewing Co., c/o E. J. Preston, Palace Hotel, brewery additions, incl. malt house, brew house, fermenting house, etc., Mission St., day labor. $40,000. Noted June 22.

Calif., Stockton — BREWERY — El Dorado Brewing Co., 626 North American St., 1 story, brick, concrete bottling plant, Stanislaus and Oak Sts., to J. F. Shephard, 108 East Miner Ave., $20,000 exclusive of equipment.

Fla., Jacksonville—CIGAR FACTORY—Jno. H. Swisher & Son, Inc., additions to buildings and inside equipment and adding new special machinery for manufacture of cigars. Est. $100,000. Work started.

Ga., Griffin—MILL UNIT—Lowell Bleachery, Griffin, 3 story, basement, 100 x 110 ft., structural steel, brick, mill unit, concrete pile found., to Newton Coal & Lumber Co., Griffith. Private plans.

Ga., Rossville — FACTORY — Standard-Coosa-Thatcher Co., 19th and Main Sts., Chattanooga, Tenn., 1 story, 14x100x100 ft. brick, rein.-con. shipping department addition to textile mill, to Mark K. Wilson Co., Power Bldg., Chattanooga, Tenn., $30,000. Awarded June 15.

Ill., Freeport—GASOLINE SERVICE STATIONS—White Star Oil Co., Rockford, group service stations, here and in other locations, separate contracts. $28,000 or more.

Ind., Bloomington—SUPER SERVICE STATION—Kerr & Riley, Bloomington, brick, steel, to F. W. Fennerman, Bloomington. Est. $29,200. H. Foltz, 1037 Architects Bldg., Indianapolis, archt.

Ind., Indianapolis—FACTORY—J. A. Cooper, 735 East Ohio St., 1 story, brick, steel, 735 East Ohio St., own forces. $28,500. Private plans.

Ind., Indianapolis — FACTORY — Fairmount Glass Wks., 1601 South Keystone St., altering and constructing 1 story, 86x101 ft., brick, steel addition, steel contract, to Hetherington & Berner, 701 Kentucky Ave. Est. $29,000.

Ind., Indianapolis—PLANT—Swart & Love Ice Cream Co., 3901 East Washington St., plant, day labor and separate contracts. $28,500.

Ind., Indianapolis—SUPER SERVICE STATION—Lincoln Oil & Refining Co., brick, steel, Massachusetts and St. Clair Sts. to W. P. Jungclaus, 825 Massachusetts Ave. Est. $29,000.

Ind., Indianapolis—SERVICE STATION—Shell Petroleum Corp., E. H. Bean, supt., 2219 West Michigan St., brick, steel super service station, to W. E. Mick, 1020 East Michigan Ave. Est. $29,000.

Ind., Indiana Harbor—TIN MILL—Inland Steel Co., 38 South Dearborn St., Chicago, Ill., engineering and manufacturing tin mill to Mesta Machine Co., West Homestead St., Pittsburgh, Pa. Est. $2,000,000. Work started. Will require 1,200 tons steel.

Ky., Louisville—PLANT—Sengel Cooperage Wks., Inc., 930 Mason Ave., plans expending $30,000 for new woodworking machinery and equipment and $30,000 for repairs and changes to building, day labor.

Mass., Middleboro — GARAGE — Nemasket Transportation Co., P. Iampietro, in charge, 49 Vine St., rebuilding 1 story, basement, 60 x 120 ft., concrete to E. W. Harlow, 83 School St. Noted June 15.

Mass., Revere—LAUNDRY—Mayflower Laundries, E. Buckley, 27 Greene St., 1 and 2 story, 100x150 ft. laundry, Greene St. Owner builds. Est. $32,000. Noted June 22.

Mass., Somerville—WAREHOUSE and STORE—A. Rosenstein, archt., 120 Milk St., Boston, 2 story, basement, 100x200 ft., brick, cast stone, Bow St. and Warren Ave., to D'Amore Constr. Co., 89 State St., Boston, for Owner, c/o architect, F. W. Woolworth Co., 31 St. James Ave., Boston, lessee. Noted June 15.

Mo., Ilmo—CLOTHING FACTORY—Ely & Walker Dry Goods Co., 1520 Washington Ave., 1 story, 125x200 ft., brick, steel addition, 25,000 sq.ft. floor space, to J. Miller, Ilmo. Est. $27,500.

N. J., Asbury Park—STORAGE PLANT—Reid Ice Cream Co., E. J. McGloin, in charge, 900 Monroe St., cement block, storage plant, plain found., 900 Monroe Ave., separate contracts. $28,000 incl. equipment. Private plans. Former bids rejected. Noted June 15.

N. J., Glen Rock—GARAGE—Bergen County Coal Co., J. Marron, in charge, Doremus Ave., general contract 1 story, brick, cinder blocks, plain found., Doremus Ave., to G. W. Peterson, 322 North Monroe St., Ridgewood. Est. about $28,000 incl. equipment.

N. J., Irvington—AUTO SERVICE STATION—Peerless Oil Co., J. K. Burns, in charge, 122 East 42nd St., New York, 1 story, hollow tile, stucco, plain found., Springfield Ave. and Lincoln Pl. separate contracts. Est. about $28,000 with equipment. Private plans.

N. J., Jersey City—POWER PLANT—Standard Laundry Co., Inc., A. D. Hirsch, pres., 985 Garfield Ave., altering 1 story, basement, 95x110 ft., brick, 963 Garfield Ave., to B. Genhonon, 963 Garfield Ave. Separate contracts for equipment. Private plans. Total est. $28,000 incl. equipment. Noted Mar. 23.

N. J., Little Ferry—FACTORY—Flintkote Co., Bergen Turnpike, altering 2 and 3 story, basement, brick, plain found., Bergen Turnpike, separate contracts. $28,000 incl. equipment. Private plans.

N. J., Newark—BREWERY—Christian Feigenspan Corp., C. W. Feiganspan, pres., 50 Freeman Ave., 1 story, basement, 95x100 ft., brick, steel brewery and bottling plant addition, plain found., separate contracts. $40,000. C. Wuender, Architects Bldg., Phila., Pa., archt. Noted June 15.

N. J., Newark—FACTORY—Long & Koch, Inc., 507 Clinton Ave., general contract rebuilding 1 story, basement, brick, steel, plain found., 130 South St., to J. J. Thomas, 428 Peshine Ave. Est. $28,000 with equipment.

N. J., Newark—STORAGE, etc.—Insel & Insel, Inc., A. Insel, secy., 225 Pacific St., general contract 1 story, part basement, brick hide storage building and garage, plain found., 225 Pacific St., to C. Schroeder, 32 Whitney St. Est. $28,000 incl. equipment.

N. J., New Brunswick—MARKET—J. K. Turton & Co., Inc., general contractors, 70 East 45th St., New York, steel and ornamental iron for 1½ story market addition, Jersey and Handy Sts., to Elizabeth Iron Wks., 127 Franklin St., Elizabeth; electrical work, to C. P. Hansen, 230 New St., Belleville, for Swift & Co., F. Morris, in charge, 32 10th Ave., New York. Noted June 15.

N. J., Passaic—AUTO SERVICE STATION—Angelin Realty Co., 100 Prospect St., Lodi, 1 story, brick, cinder block, stucco, plain found., 902-8 Main Ave., separate contracts. Est. about $28,000 with equipment. E. R. Coe, 136 Washington St., Paterson, archt.

N. J., Passaic—BOOK BINDING SHOP—A. Horowitz, 115 Myrtle Ave., general contract 2 story, cinder block, stucco addition, plain found., to Right Built Home Constr. Co., 110 Kensington Terrace, Passaic. Est. about $28,000 incl. equipment.

N. J., Teaneck—AUTO REPAIR SHOP—West Shore Fuel Co., Station St., general contract 1 story, brick, cinder block, plain found., east side of Station St., to P. Lepore, 665 Garden St., Maywood. Est. about $28,000 incl. equipment. G. M. Cady, 1485 Teaneck Rd., archt.

N. J., Union—AUTO SERVICE STATION—Standard Oil Co. of New Jersey, 17 Washington St., Newark, general contract 1 story, brick, plain found., incl. concrete walks, drives, pumps, etc., 180 Morris Ave., to M. Friedel, 409 Summer St. Est. about $28,000 incl. equipment.

N. Y., New York—BOTTLING PLANT—J. Eichler Brewing Co., 3582 3rd Ave., 3 story, 50x88 ft. bottling plant and equipment, 3rd Ave. and 169th St., separate contracts. $28,000. Owner now completing purchase of equipment. G. W. Kibitz, 633 King Ave., archt. Noted Dec. 8.

N. C., Burlington—MILL—McEwen Knitting Co., 84x110 ft. rein.-con. addition, also new equipment, Ireland St. to Fowler-Jones Constr. Co., Winston-Salem, $30,000. J. E. Sirrine Co., Greenville, S. C., engrs. Awarded June 21.

N. C., Weldon—SERVICE REPAIR STATIONS, etc.—Sinclair Refining Co., 45 Nassau St., New York, group service and gasoline stations, here and other locations, separate contracts. Est. exceeds $28,000. Noted May 11.

Pa., Coraopolis—REFINERY—Canfield Oil Co., oil refinery addition and 13 storage tanks, separate contracts. To exceed $100,000.

Pa., Phila. — MANUFACTURING — American Commercial Alcohol Corp., Delaware Ave. and Tasker St., 3 story, 80x90 ft. manufacturing building, to S. H. Levin, 1619 Sansom St. Est. $50,000. Noted Dec. 8.

Pa., Phila.—STORAGE—Trainer Brewing Co., 1306 Fitzwater St., 5 story, tank storage building, Clarion and Clymer Sts., to Francis A. Canuso & Son, 804 South 12th St. Est. $30,000. E. J. Fitzmaurice, 5821 Pine St., engr. Noted May 11 under "Contracts Awarded."

Pa., Tyrone—CLOTHING FACTORY—R. M. Putnam, Tyrone Industrial Corp., 1 story, 120x318 ft., brick, steel to Yenter Bros., Tyrone. Est. $60,000. Reliance Mfg. Co., Chicago, Ill., lessee. Noted June 15.

R. I., Providence—MILL—Franklin Rayon Co., 86 Crary St., 1 story, basement, 45x160 ft., brick addition, concrete found., to A. F. Smiley Constr. Co., 202 Oak Hall Bldg.

S. D., Letcher—GARAGE, etc.—Farmers Union Oil Co., 1 story, brick, service garage and gasoline station, separate contracts. Est. about $28,500 with equipment.

Tex., Corpus Christi—CHEMICAL PLANT—Southern Alkali Corp., c/o H. A. Gault, pres., Barberton, O., general contract chemical plant, to H. K. Ferguson Co., Hanna Bldg., Cleveland, O. Est. $7,000,000. Noted May 19, 1932.

Tex., Fort Worth—BREWERY—S. Leiter & O. Lamens, Fort Worth remodeling brewery, incl. 70 tons steel for vats, 2 carloads cork, wiring, plumbing, partitions, etc., 9th and Jones Sts. Owner builds. Private plans.

Tex., Texas City—REFINERY—Pan American Petroleum & Transport Co., c/o J. A. Whitley, purch. agt., and Mexican Petroleum Co., 122 East 42nd St., New York, grading for refinery, to Roberts & Moeller, Hitchcock***drainage work to A. Kelso Co., Galveston; fencing, to Paul Shean Co., 2021 B St., Galveston. Noted June 22, under "Contracts Awarded."

Wis., Carrollville—PLANT—United Fertilizer Co., masonry and concrete work for remodeling fertilizer plant, to P. Riesens Sons, 2660 North Humboldt Ave., Milwaukee***steel sash, to Federal Steel Sash Co., Waukesha***glass and glazing, to Milwaukee Plate & Window Glass Co., 508 South 2nd St., Milwaukee***painting, to H. Weden & Son, 1137 North Jackson St., Milwaukee***roofing, to Winding Roofing Co., 110 East Wisconsin Ave., Milwaukee***overhead doors, to Overhead Door Co., 1736 North 2nd St., Milwaukee. F. F. Droishagen, 645 West Virginia St., Milwaukee, archt.

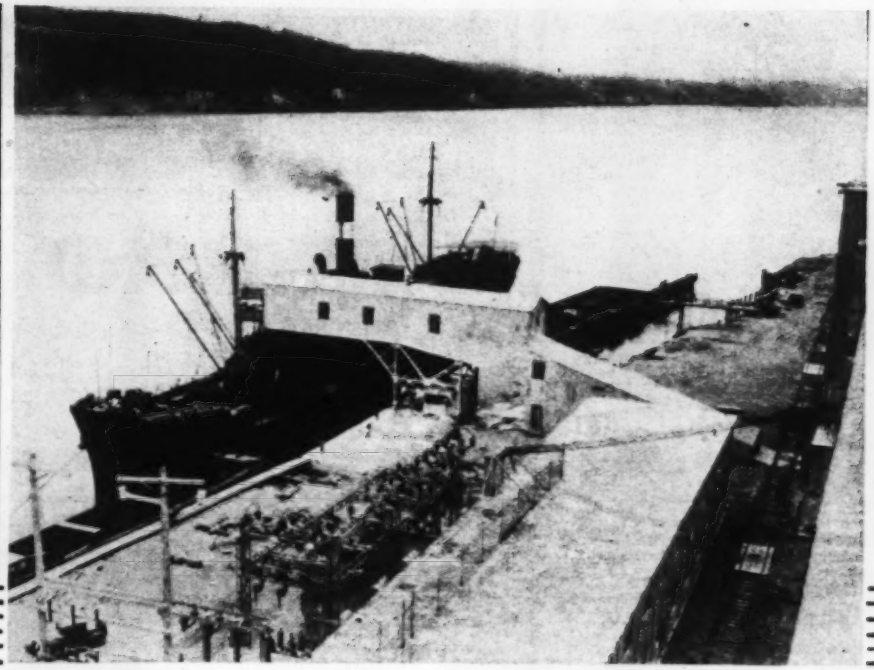
Ont., Kirkland Lake — MILL — Wright-Hargraves Mines Ltd., Liberty Bank Bldg., Buffalo, N. Y., new head frame and shaft house, at mill, day labor. $50,000. Owner now taking bids.

Ont., Simcoe—COLD STORAGE PLANT—Norfolk Fruit Growers Assn., G. Wilson, mgr., 2 story, 92x96 ft., brick addition, to Schultz Bros., Brantford. Est. $35,000.

Construction News page 214

For official proposal advertising see Searchlight Section

†*Federal Government.*



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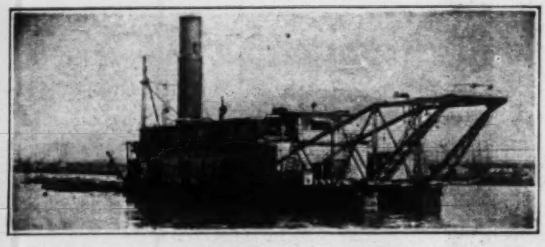

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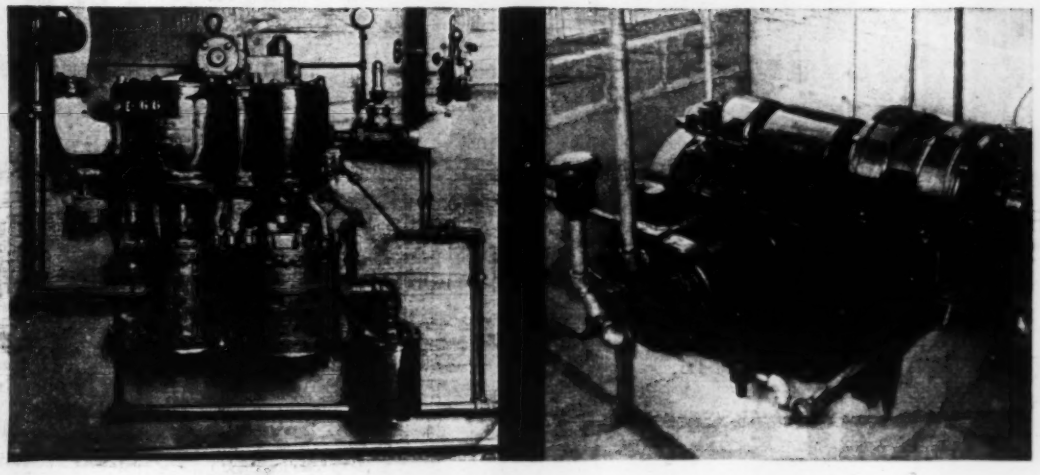

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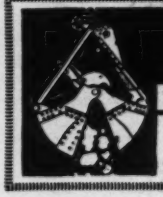

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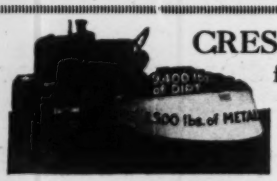

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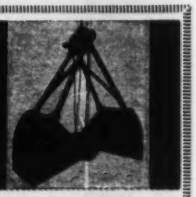

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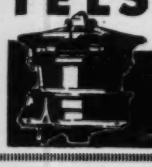

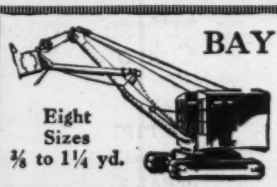

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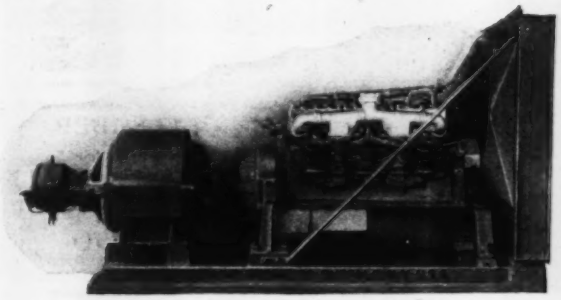

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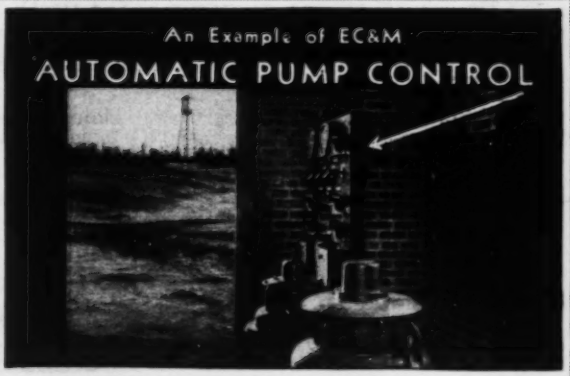

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The advertisements in the Searchlight Section are constantly bringing together those who buy, sell, rent or exchange.
They convert idle commodities into useful cash, idle cash into useful commodities, and that which you have but don't want into that which you want but don't have.
The cost is a trifle, the results considerable.

Get Your Wants into the Searchlight

OFFICIAL PROPOSALS

Bids: July 19.

State Road Work

Dover, Del.

Sealed proposals will be received by the State Highway Department, at its office, Dover, Del., until 2.00 o'clock P.M., Eastern Standard Time, July 19, 1933, and at that place and time publicly opened for contracts involving the following approximate quantities:

CONTRACT 292
TODDS CHAPEL TO PROSPECT CHURCH, 5.714 Mi.
16 ft. Traffic Bound Slag

5.714	Miles Grading
5000	Cu.Yds. Borrow
2900	Tons Traffic Bound Slag
1000	Lin.Ft. 15" R. C. Pipe
250	Lin.Ft. 18" R. C. Pipe
40	Lin.Ft. 30" R. C. Pipe
3M	Ft. B. M. Creosoted Timber

CONTRACT 302
COVERDALE "X" RD. TO SMITH SCHOOL 3.713 Mi.
16 ft. Traffic Bound Slag

1.7	Acres Clearing
1.7	Acres Grubbing
3.713	Miles Grading
2000	Cu.Yds. Borrow
2000	Tons Traffic Bound Slag
300	Lin.Ft. 15" R. C. Pipe
150	Lin.Ft. 18" R. C. Pipe
30	Lin.Ft. 24" R. C. Pipe

CONTRACT 303
PEARSON'S CORNER—PRATT SCHOOL 2.30 Mi.
16 ft. Traffic Bound Slag

1	Acre Clearing
1	Acre Grubbing
2.3	Miles Grading
2000	Cu.Yds. Borrow
1400	Tons Traffic Bound Slag
600	Lin.Ft. 15" R. C. Pipe

CONTRACT 304
HOLLANDSVILLE—MD. LINE 4.037 Mi.
16 ft. Traffic Bound Slag

2.8	Acres Clearing
2.8	Acres Grubbing
4.037	Miles Grading
4000	Cu.Yds. Borrow
2020	Tons Traffic Bound Slag
540	Lin.Ft. 15" R. C. Pipe
170	Lin.Ft. 18" R. C. Pipe
170	Lin.Ft. 24" R. C. Pipe
144	Lin.Ft. 30" R. C. Pipe

CONTRACT 309
ZOAR CAMP—ANGOLA 6.897 Mi.
16 ft. Traffic Bound Slag

7.6	Acres Clearing
7.6	Acres Grubbing
6.897	Miles Grading
3000	Cu.Yds. Borrow
3500	Tons Traffic Bound Slag
800	Lin.Ft. 15" R. C. Pipe
70	Lin.Ft. 18" R. C. Pipe
70	Lin.Ft. 24" R. C. Pipe

CONTRACT 311
RAYMONDS NECK ROAD 3.977 Mi.
16 ft. Traffic Bound Slag

1	Acre Clearing
1	Acre Grubbing
3.977	Miles Grading
3000	Cu.Yds. Borrow
2000	Tons Traffic Bound Slag
700	Lin.Ft. 15" R. C. Pipe
32	Lin.Ft. 18" R. C. Pipe
68	Lin.Ft. 24" R. C. Pipe
76	Lin.Ft. 30" R. C. Pipe

CONTRACT 316
PORTERS TO SALEM CHURCH 4.274 Mi.
16 ft. Traffic Bound Slag

2	Acres Clearing
2	Acres Grubbing
4.274	Miles Grading
10,000	Cu.Yds. Borrow
2,500	Tons Traffic Bound Slag
250	Cu.Yds Class A Concrete
20,000	Lbs. Reinforcement
25,000	Lbs. Structural Steel
600	Lin.Ft. 15" R. C. Pipe
120	Lin.Ft. 18" R. C. Pipe
90	Lin.Ft. 24" R. C. Pipe
2,000	Lin.Ft. Wire Cable Guard Rail
2,000	Lin.Ft. Wood Shoulder Curb

CONTRACT D-1
SEED AND FERTILIZER

3	Tons Assorted Grass Seed
20	Tons Fertilizer

Performance of contract shall commence within ten (10) days after execution of the contract and be completed as specified.

The minimum wages paid will be thirty cents per hour for unskilled labor and forty cents per hour for skilled labor in New Castle County and twenty-five cents per hour for unskilled labor and thirty-five cents per hour for skilled labor in Kent and Sussex counties.

Monthly payments will be made for 90 per cent of the construction completed each month.

Bidders must submit proposals upon forms provided by the Department.

Each proposal must be accompanied by a surety bond, certified check, or money to the amount of at least ten (10) per centum of the total amount of the proposal.

The envelope containing the proposal must be marked "Proposal for the construction of State Highway Contract No....."

The contract will be awarded or rejected within twenty (20) days from the date of opening proposals.

The right is reserved to reject any or all bids.

Complete sets of plans and specifications may be obtained after July 10, 1933, upon receipt of two dollars ($2.00) for each contract, which amount will not be refunded.

STATE HIGHWAY DEPARTMENT
Dover, Delaware

Bids: July 19.

Heating, Sanitary and Equipment
Kitchen Equipment

HUDSON RIVER STATE HOSPITAL
POUGHKEEPSIE, N. Y.
Spec. Nos. 7495, 7496, 7497

Separate sealed proposals covering Heating Work, Sanitary Work and Equipment, Kitchen Equipment, Continued Treatment Buildings, Kitchen and Dining Room Section of Buildings Nos. 13 and 14; Farm Colony Building No. 3; Tuberculosis Building No. 4, Hudson River State Hospital, Poughkeepsie, N. Y., in accordance with Spec. Nos. 7495, 7496, and 7497 and accompanying drawings, will be received by the Commissioner, Depart. of Mental Hygiene, 18th Floor, State Office Building, Albany, N. Y., until 1 o'clock p.m. (Eastern Standard Time) on Wednesday, July 19, 1933.

Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidders will be required to give a bond in the sum of 50% of the amount of the contract. Corporations submitting proposals shall be authorized to do business in the State of New York. Drawings and specifications may be examined free of charge at the following offices:

Commissioner of Architecture, State Office Building, New York City.

Commissioner of Architecture, State Office Building, Albany, New York.

District Engineer, 109 N. Genesee St., Utica, N. Y.

District Engineer, Weighlock Building, Syracuse, N. Y.

District Engineer, Barge Canal Terminal, Rochester, N. Y.

District Engineer, 65 Court St., Buffalo, N. Y.

District Engineer, 71 Frederick St., Binghamton, N. Y.

Hudson River State Hospital, Poughkeepsie, N. Y.

Drawings and specifications may be obtained from the Commissioner of Architecture, State Office Building, Albany, N. Y., upon payment of $5.00 for each set of Heating, Sanitary or Equipment drawings and specifications. Proposal blanks and envelopes will be furnished without charge.

Half of this payment will be returned if the drawings and specifications are returned in good condition to the Commissioner of Architecture, State Office Building, Albany, N. Y., within two weeks after date of opening bids.

Dated: June 5, 1933.

Bids: July 26.

Additional Water Supply

HUDSON RIVER STATE HOSPITAL
POUGHKEEPSIE, DUTCHESS COUNTY, N. Y.

Sealed proposals for Additional Water Supply, Hudson River State Hospital, Poughkeepsie, Dutchess County, New York, will be received at the office of the Department of Mental Hygiene, State Office Building, Albany, New York, until 2 p.m., Eastern Daylight Saving Time, Wednesday, July 26, 1933, when they will be publicly opened and read. Proposals shall be endorsed on the envelope, "Proposal for Additional Water Supply, Hudson River State Hospital, Poughkeepsie, Dutchess County, New York," and addressed to the Department of Mental Hygiene, State Office Building, Albany, New York, and shall be accompanied by a deposit consisting of a certified check drawn upon some legally incorporated bank in this State and made payable at sight to the State of New York, or money, for not less than Five percent (5%) of the amount of the proposal. The contractor to whom award is made will be required to furnish for the faithful performance of the work a surety bond in the sum of Fifty percent (50%) of the amount of the contract. The right is reserved to reject any and all bids. Specifications and plans for this contract may be examined at the office of the Department of Mental Hygiene, State Office Building, Albany, N. Y.; at the office of the Chief Engineer, Department of Public Works, Division of Engineering, State Office Building, Albany, N. Y.; at the office of the District Engineer, Department of Public Works, Pleasant Valley Road, Poughkeepsie, N. Y.; at the office of the Department of Public Works, 30 Centre Street, New York, N. Y., and at the office of the Superintendent of the Hudson River State Hospital, Poughkeepsie, N. Y. Plans and specifications for this contract will be furnished by the CHIEF ENGINEER, DEPARTMENT OF PUBLIC WORKS, DIVISION OF ENGINEERING, STATE OFFICE BUILDING, ALBANY, NEW YORK, upon payment of $7.70. No refund will be made for plans returned. The estimated cost of this project is $127,933.00.

DEPARTMENT OF MENTAL HYGIENE,
F. W. PARSONS,
Commissioner.

Bids: July 18.

Sewage Disposal

NEW YORK STATE RECONSTRUCTION HOME
WEST HAVERSTRAW, ROCKLAND COUNTY, NEW YORK

Sealed proposals for sewage disposal at the New York State Reconstruction Home, West Haverstraw, Rockland County, New York, will be received at the office of the Department of Health, State Office Building, Albany, New York, until 2 P.M., Eastern Daylight Saving Time, Tuesday, July 18, 1933, when they will be publicly opened and read. Proposals shall be endorsed on the envelope, "Proposal for Sewage Disposal at the New York State Reconstruction Home, West Haverstraw, Rockland County, New York," and addressed to the Department of Health, State Office Building, Albany, New York, and shall be accompanied by a deposit consisting of a certified check drawn upon some legally incorporated bank in this State and made payable at sight to the State of New York, or money, for not less than Five percent (5%) of the amount of the proposal. The contractor to whom award is made will be required to furnish for the faithful performance of the work a surety bond in the sum of Fifty percent (50%) of the amount of the contract. The right is reserved to reject any and all bids. Specifications and plans for this contract may be examined at the office of the Department of Health, State Office Building, Albany, N. Y.; at the office of the Chief Engineer, Department of Public Works, Division of Engineering, State Office Building, Albany, N. Y.; at the office of the District Engineer, Department of Public Works, Pleasant Valley Road, Poughkeepsie, N. Y.; at the office of the Department of Public Works, 80 Centre Street, New York, N. Y., and at the office of the Superintendent of the New York State Reconstruction Home, West Haverstraw, N. Y. Plans and specifications for this contract will be furnished by the CHIEF ENGINEER, DEPARTMENT OF PUBLIC WORKS, DIVISION OF ENGINEERING, STATE OFFICE BUILDING, ALBANY, NEW YORK, upon payment of $3.50. No refund will be made for plans returned. The estimated cost of this project is $40,565.30.

DEPARTMENT OF HEALTH,
THOMAS PARRAN, JR.,
Commissioner.

Bids: July 7.

Highway Work

Yates, Ill.

Bids will be taken by Yates and Chenoa Townships, McLean County, Illinois, in Room 5, Court House, Bloomington, Illinois, up to 10:00 A.M. Friday, July 7, 1933, for furnishing, pulling, crushing, screening, hauling and distributing approximately Ninety Thousand (90,000) cubic yards of gravel. The plans and proposals may be had from P. J. Keller, County Superintendent of Highways, Room 5, Court House, Bloomington, Illinois, upon deposit of Ten Dollars.

Notice to Contractors

As a part of prequalification requirements of the State of Tennessee, all contractors bidding on State Highway work must obtain a license in accordance with Chapter 70, Acts of 1931. Applications must be on file with the State Board for Licensing General Contractors at Nashville, Tennessee, at least thirty days prior to any letting in which any contractor expects to bid.

OFFICIAL PROPOSALS

Bids: July 5.

Notice to Contractors

Separate sealed proposals covering construction, sanitary and electric work for each of the Horticultural Building and the Farm Machinery and Implement Building at the State Fair grounds, Syracuse, N. Y., in accordance with plans and specifications prepared for same, will be received by the New York State Fair Industrial Exhibit Authority at its offices, 304 Denison Bldg., 211 E. Fayette St., Syracuse, N. Y. until 2 o'clock p.m. eastern standard time July 5th, 1933. Proposals shall be accompanied by a certified check or money deposit for 5% of the amount of the bid. Successful bidders will be required to give a bond in the sum of 50% of the amount of the contracts. Bidders will be required to furnish satisfactory evidence of responsibility, both financial and by experience, for the execution of the work. Drawings and specifications may be examined free of charge at the offices of the Industrial Exhibit Authority; the office of the Architect, A. L. Brockway, Clinton Square Building, Syracuse, N. Y.; at the Rochester Builders Exchange, 135 Spring St., Rochester, N. Y.; or F. W. Dodge Corp., 317 Jackson Building, Buffalo, N. Y.

Proposal blanks and envelopes may be obtained and drawings and specifications may be purchased by general or subcontractors from the Architect, Clinton Square Building, Syracuse, N. Y. upon payment of $12.00 for each set of construction drawings and specifications and $6.00 for each set of sanitary or electric drawings and specifications.

Upon the return of the drawings and specifications in good condition a refund of $5.00 will be made on the general construction sets and $3.00 on the sanitary and electric sets.

Proposals must be submitted on the proposal forms furnished and in compliance with detail called for.

Award of contract or contracts contingent upon approval by Reconstruction Finance Corporation or other federal agency of application by Industrial Exhibit Authority for funds for State Fair buildings.

N. Y. STATE FAIR INDUSTRIAL EXHIBIT AUTHORITY
CHARLES R. WHITE, President.

Bids: July 19.

Electric Elevator

ROME STATE SCHOOL
ROME, N. Y.
Spec. No. 7647

Sealed proposals covering Electric Elevator, Bake Shop, Rome State School, Rome, N. Y., in accordance with Spec. No. 7647 and accompanying drawing, will be received by the Commissioner, Dept. of Mental Hygiene, 18th Floor, State Office Building, Albany, N. Y., until one o'clock p.m. (Eastern Standard Time) on Wednesday, July 19, 1933.

Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidder will be required to give a bond in the sum of 50% of the amount of the contract. Corporations submitting proposals shall be authorized to do business in the State of New York. Drawings and specifications may be examined free of charge at the following offices:

Commissioner of Architecture, State Office Building, New York City.

Commissioner of Architecture, State Office Building, Albany, New York.

District Engineer, 109 N. Genesee St., Utica, N. Y.

District Engineer, Weighlock Building, Syracuse, N. Y.

District Engineer, Barge Canal Terminal, Rochester, N. Y.

District Engineer, 65 Court St., Buffalo, N. Y.

District Engineer, 71 Frederick St., Binghamton, N. Y.

Rome State School, Rome, N.Y.

Drawings and specifications may be obtained from the Commissioner of Architecture, State Office Building, Albany, N. Y., upon payment of $5.00 for each set of drawings and specifications. Proposal blanks and envelopes will be furnished without charge.

Half of this payment will be returned if the drawings and specifications are returned in good condition to the Commissioner of Architecture, State Office Building, Albany, N. Y., within two weeks after date of opening bids.

Dated: June 5, 1933.

OFFICIAL PROPOSALS

Bids: July 12.

Water Supply

KINGS PARK STATE HOSPITAL
KINGS PARK, SUFFOLK COUNTY, NEW YORK

Sealed proposals for water supply at the Kings Park State Hospital, Kings Park, Suffolk County, New York, will be received at the office of the Department of Mental Hygiene, State Office Building, Albany, New York, until 2 P.M., Eastern Daylight Saving Time, Wednesday, July 12, 1933, when they will be publicly opened and read. Proposals shall be endorsed on the envelope, "Proposal for Water Supply, Kings Park State Hospital, Kings Park, Suffolk County, New York," and addressed to the Department of Mental Hygiene, State Office Building, Albany, New York, and shall be accompanied by a deposit consisting of a certified check drawn upon some legally incorporated bank in this State and made payable at sight to the State of New York, or money, for not less than Five per cent (5%) of the amount of the proposal. The contractor to whom award is made will be required to furnish for the faithful performance of the work a surety bond in the sum of Fifty per cent (50%) of the amount of the contract. The right is reserved to reject any and all bids. Specifications and plans for this contract may be examined at the office of the Department of Mental Hygiene, State Office Building, Albany, N. Y.; at the office of the Chief Engineer, Department of Public Works, Division of Engineering, State Office Building, Albany, N. Y.; at the office of the District Engineer, Department of Public Works, 122 West Main Street, Babylon, L. I., N. Y.; at the office of the Department of Public Works, 80 Centre Street, New York, N. Y., and at the office of the Superintendent, Kings Park State Hospital, Kings Park, Suffolk County, N. Y. Plans and specifications for this contract will be furnished by the CHIEF ENGINEER, DEPARTMENT OF PUBLIC WORKS, DIVISION OF ENGINEERING, STATE OFFICE BUILDING, ALBANY, NEW YORK, upon payment of $3.85. No refund will be made for plans returned. The estimated cost of this project is $38,470.00.

DEPARTMENT OF MENTAL HYGIENE,
F. W. PARSONS, Commissioner.

Bids: July 26.

Drainage for Buildings O and R

ROME STATE SCHOOL
ROME, ONEIDA COUNTY, NEW YORK.

Sealed for Drainage for Buildings O and R, Rome State School, Rome, Oneida County, New York, will be received at the office of the Department of Mental Hygiene, State Office Building, Albany, New York, until 2 p.m., Eastern Daylight Saving Time, Wednesday, July 26, 1933, when they will be publicly opened and read. Proposals shall be endorsed on the envelope, "Proposal for Drainage for Buildings O and R, Rome State School, Rome, Oneida County, New York," and addressed to the Department of Mental Hygiene, State Office Building, Albany, New York, and shall be accompanied by a deposit consisting of a certified check drawn upon some legally incorporated bank in this State and made payable at sight to the State of New York, or money, for not less than Five per cent (5%) of the amount of the proposal. The contractor to whom award is made will be required to furnish for the faithful performance of the work a surety bond in the sum of Fifty per cent (50%) of the amount of the contract. The right is reserved to reject any and all bids. Specifications and plans for this contract may be examined at the office of the Department of Mental Hygiene, State Office Building, Albany, N. Y.; at the office of the Chief Engineer, Department of Public Works, Division of Engineering, State Office Building, Albany, N. Y.; at the office of the District Engineer, Department of Public Works, 109 North Genesee Street, Utica, N. Y.; at the office of the Department of Public Works, 80 Centre Street, New York, N. Y., and at the office of the Superintendent of the Rome State School, Rome, N. Y. Plans and specifications for this contract will be furnished by the CHIEF ENGINEER, DEPARTMENT OF PUBLIC WORKS, DIVISION OF ENGINEERING, STATE OFFICE BUILDING, ALBANY, NEW YORK, upon payment of $1.40. No refund will be made for plans returned. The estimated cost of this project is $6,239.00.

DEPARTMENT OF MENTAL HYGIENE,
F. W. PARSONS, Commissioner.

U. S. Government

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., June 12, 1933.—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., July 17, 1933, for furnishing all labor and materials and performing all work for the complete *construction of buildings Nos. 1, 2, 3, and 4 and wharf at the U. S. quarantine station, Los Angeles, Calif.* Attention is directed to the Act of Mar. 3, 1931 (Public No. 798) relative to rates of wages; the Act of March 3, 1933 (Public No. 428) relative to domestic materials; and the special conditions of bidding set forth in the specification. Drawings and specifications, not exceeding 3 sets, may be obtained at this office in the discretion of the Supervising Architect by any general contractor, and provided a deposit of $15.00 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, provided a deposit of $15.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (254)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., June 16, 1933—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p. m., July 14, 1933, for furnishing all labor and materials and performing all work for the *extension and remodeling (except elevator) of the U. S. post office at Asbury Park, N. J.* Attention is directed to the Act of March 3, 1931 (Public No. 798) relative to rates of wages; the Act of July 21, 1932 (Public No. 302) relative to employment of labor; the Act of March 3, 1933 (Public No. 428) relative to domestic materials; and the special conditions of bidding set forth in the specification. Drawings and specifications, not exceeding 3 sets, may be obtained at this office in the discretion of the supervising architect by any general contractor, and provided a deposit of $15.00 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, provided a deposit of $15.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (257)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., June 13, 1933.—Sealed bids in duplicate, subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., July 11, 1933, for furnishing all labor and materials and performing all work for the *construction of the U. S. post office, etc., at Portsmouth, Ohio.* Attention is directed to the Act of March 3, 1931 (Public No. 798) relative to rates of wages; the Act of March 3, 1933 (Public No. 428) relative to domestic materials; and the special conditions of bidding set forth in the specification. Drawings and specifications, not exceeding 3 sets, may be obtained at this office in the discretion of the supervising architect by any general contractor, and provided a deposit of $25.00 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, provided a deposit of $25.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (252)

WAR DEPARTMENT: United States Engineer Office, Galveston, Texas. Sealed bids will be received here until 12 noon, July 26, 1933, and then publicly opened, for *dredging approximately 4,312,000* yards of material in the maintenance of Galveston Channel, Texas. Further information on application. (261)

OFFICIAL PROPOSALS

Bids: July 20.

Storm Water Drain

Buffalo, N. Y.

The Commissioner of Public Works will receive sealed proposals at Room 502 City Hall, Buffalo, N. Y., until 11 o'clock a.m., Daylight Saving Time, July 20, 1933, for the construction of a 16' 0" x 10' 9" 8' 6" x 9' 0", 8' 6" x 8' 6" Reinforced Concrete and 6' 6" and 3' 6" diameter storm water drain in Smith Street, right of way across lands of the Erie Railroad Company, Smith Street, right of way across lands of the New York Central Railroad Company (formerly South Railroad Avenue) Fillmore Avenue, Lindburgh Drive, Gibson Street, Stanislaus Street and Mills Street between the new channel line at Buffalo River and Genesee Street, together with outlet and retaining wall supported upon pile foundation across full width of Smith Street, inverted siphons and weir chambers.

Work includes construction of about 12,330 feet of reinforced concrete, rectangular section and 4000 feet of circular storm water drain of above sizes; 125,000 cubic yards earth and 19,000 cubic yards rock excavation; removal and replacing pavement, water mains, construction of siphons, maintenance of flow of sewers, etc.

Bids and contract will be on a lump sum basis.

No proposal will be accepted unless it be accompanied by a certified check, payable to the City of Buffalo, for five (5%) per cent of the amount of the bid, or, in lieu of such certified check, a bid bond running to the City of Buffalo, approved as required by the Charter, in the amount of, not less than twenty-five per cent (25%) of the amount of the bid, also attached questionnaire filled out.

Plans and specifications, form of contract and proposal blank will be mailed or may be taken from the office of the Division of Engineering upon the deposit of $15.00 with the Secretary of the Department of Public Works, said sum will be returned to the bidders submitting proposals, $10.00 will be returned to those not submitting proposals upon return of plans and specifications in good condition.

The Commissioner of Public Works reserves the right to reject any and all bids and waive any informalities.

Formal advertisement will be found in the Buffalo Courier-Express, Buffalo News and City Record on June 23, 1933.

This is not a formal advertisement.

WILLIAM A. RATHMANN,
Commissioner of Public Works,
502 City Hall,
Buffalo, New York.

Bids July 12.

Tunnel and Ditch Construction

Ordway, Colo.

Subject to the conditions set forth in the official Invitation for Bids, sealed proposals for constructing the Independence Pass Trans-Mountain Water Diversion System will be received by the undersigned at its office in Ordway, Colorado, on Wednesday, July 12th, 1933, at 9 o'clock A.M., and then publicly opened. The work is located about 20 miles east of Aspen, Colorado, and consists of tunnel excavation, ditch and dam construction.

ESTIMATED:
Schedule No. 1.
3.8 miles tunnel 9' 2½" diameter;
3.9 miles canal;
75,000 cu.yds. canal and portal excavation;
120,000 cu.yds. rock and earth embankment for dams;
Schedule No. 2.
1.75 miles tunnel 8' 2½" diameter;
5.7 miles canals;
140,000 cu.yds. canal and portal excavation;
6000 cu.yds. rock and earth embankment for dams.

Drawings, specifications, form of bids, contract and bond for the proposed work will be furnished upon payment of $10.00.

Each proposal must be accompanied by certified check for $50,000, and a bidder to whom an award is made must furnish bond of not less than 75% of contract price in at least two surety companies. Our Company reserves the right to reject any and all bids.

THE TWIN LAKES RESERVOIR AND CANAL COMPANY
O. R. Smith, Chief Engineer,
Ordway, Colorado.

OFFICIAL PROPOSALS

Bids: July 15.

State Highway Work

STATE DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS
ALBANY, N. Y.

Sealed proposals will be received by the undersigned at the State Office Building, 13th Floor, Albany, N. Y., until one o'clock p. m. advanced standard time, which is twelve o'clock noon eastern standard time, on Friday, July 14th, 1933, for the construction of highways in the following counties:

	Miles	Deposit Required
QUEENS		
Grading and Structures	0.15	$3,500
Grading and Structures, Bit. Mac. Mixed in Place	0.32	5,000
HAMILTON & WARREN	(Completion)	
Preliminary Gravel Surfacing	14.89	22,000
ALSO FOR THE RECONSTRUCTION OF THE FOLLOWING:		
CORTLAND (Completion)		
190' Truss Bridge—Bit. Mac. M.M. Opt. or concrete approach	0.18	700
DELAWARE (Completion)		
100' Truss Bridge Bit. Mac. M.M. Opt. Approach	0.09	1,200

Maps, plans, specifications, and estimates may be seen and proposal forms obtained at the office of the Department in Albany, N. Y., and also at the office of the District Engineers in whose district the roads are located, upon the payment of Five Dollars ($5.00) for plans and proposal forms. Standard specifications are Two Dollars ($2.00) per copy. Refund will not be made on plans, proposal forms or specifications. The addresses of the District Engineers and counties in each district will be furnished upon request. Plans and proposal forms may also be seen at the office of the State Department of Public Works, State Office Building, Worth & Center Streets, New York City.

Especial attention of bidders is called to "General Information for Bidders" in the itemized proposal, specifications, and contract agreement. The amount of the certified check accompanying the proposal of the bidder to whom the contract is awarded will be returned when ten per centum of the work under the contract has been completed. If Surety Bond is dispensed with pursuant to the Highway Law, the amount of the bidding check will be returned when 15% of the contract work has been completed.

The minimum hourly rate of wages for unskilled labor on these projects, except highway in Hamilton & Warren Counties, has been designated by the State Industrial Commissioner, pursuant to Chapter 733 of the Laws of 1933, as fifty cents per hour for projects in the Counties in the Metropolitan District, consisting of Nassau, Rockland, Suffolk, Westchester, and Counties within New York City, and as forty cents per hour for the projects in other counties of the State outside the Metropolitan District. The schedule of wages to be paid for other workmen and mechanics employed on these projects, pursuant to Chapter 731 of the Laws of 1933, except Highway No. E.8428, Hamilton and Warren Counties, has been established and is annexed to and forms a part of the specifications for the projects, and may be ascertained upon reference to the proposal for the project itself.

The completion contract mentioned above in Hamilton and Warren Counties is an Employment Relief Project. The minimum rate for unskilled labor on this contract shall be from forty cents to fifty cents per hour, as specified in the contract, and the minimum rate for skilled labor shall be fifty cents to sixty cents per hour, as specified in this contract. Veterans of the U. S. Military Service with dependents, where qualified to do the work, shall be given preference in employment. No person, except those in supervisory, executive or administrative positions, shall be employed for more than thirty hours in any week. Details of these regulations with respect to preference in employment, use of hand labor, hours of employment, etc. will be found in the itemized proposal.

A. W. BRANDT,
Commissioner of Highways.

SERVICE SECTION

BULK CEMENT

Complete equipment for handling cement from car or truck TO BIN. Economical, dust-tight, weather proof. Portable, low first cost. Write for details.

SPROUT, WALDRON & COMPANY, INC.
1270 Sherman St., Muncy, Pennsylvania
Conveyors, Elevators, Cement Scales, Power Transmission Appliances

U. S. Government

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., June 10, 1933.—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., July 10, 1933, for furnishing all labor and materials and performing all work for the *construction of the U. S. post office, etc., at Lewiston, Maine.* Attention is directed to the Act of March 3, 1931 (Public No. 798) relative to rates of wages; the Act of July 21, 1932 (Public No. 302) relative to employment of labor; the Act of March 3, 1933 (Public No. 428) relative to domestic materials; and the special conditions of bidding set forth in the specification. Drawings and specifications; not exceeding 3 sets, may be obtained at this office in the discretion of the supervising architect by any general contractor, and provided a deposit of $25.00 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, provided a deposit of $25.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS A. WETMORE, Acting Supervising Architect. (255)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., June 15, 1933.—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., July 13, 1933, for furnishing all labor and materials and performing all work for the *extension and remodeling of the U. S. post office, at Hazleton, Pa.* Attention is directed to the Act of March 3, 1931 (Public No. 798) relative to rates of wages; the Act of July 21, 1932 (Public No. 302) relative to employment of labor; the Act of March 3, 1933 (Public No. 4428) relative to domestic materials, and the special conditions of bidding set forth in the specification. Drawings and specifications, not exceeding 3 sets, may be obtained at this office in the discretion of the supervising architect by any general contractor, and provided a deposit of $15.00 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, provided a deposit of $15.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (253)

U. S. ENGINEER OFFICE, 1063 Navy Building, Washington, D. C.—Sealed proposals will be received here until 3 p.m., July 6, 1933, and then opened, for *furnishing all labor and materials and performing all work for the construction of Booster Pumping Station*, earth fill dam, and superstructure for control house, Washington Aqueduct, Washington, D. C. Further information on application. (242)

(U. S. Gov't. ads continued on page 30)

OFFICIAL PROPOSALS

Bids: July 20.

Heating Work
Electric Elevators

HOSPITAL FOR TREATMENT OF TUBERCULOSIS
Oneonta, N. Y.
SPEC. NOS. 7566 and 7683

Separate sealed proposals covering Heating Work, Superintendent's Residence, Four Family Staff Building and Service Connections, and Electric Elevators, Hospital for Treatment of Tuberculosis, Oneonta, N. Y., in accordance with Specifications Nos. 7566 and 7683 and accompanying drawings, will be received by The Commissioner, Department of Health, 15th Floor, State Office Building, Albany, N. Y., until 1 o'clock p.m. (Eastern Standard Time) on Thursday, July 20, 1933.

Proposals shall be accompanied by a certified check or money deposit of 5% of the amount of the bid. Successful bidders will be required to give a bond in the sum of 50% of the amount of the contract. Corporations submitting proposals shall be authorized to do business in the State of New York. Drawings and specifications may be examined free of charge at the following offices:

Commissioner of Architecture, State Office Building, New York City.

Commissioner of Architecture, State Office Building, Albany, N. Y.

District Engineer, 109 N. Genesee St., Utica, N. Y.

District Engineer, Weighlock Building, Syracuse, N. Y.

District Engineer, Barge Canal Terminal, Rochester, N. Y.

District Engineer, 65 Court St., Buffalo, N. Y.

District Engineer, 71 Frederick St., Binghamton, N. Y.

Drawings and specifications may be obtained from the Commissioner of Architecture, State Office Building, Albany, N. Y., upon payment of $5.00 for each set of Heating or Elevator drawings and specifications. Proposal blanks and envelopes will be furnished without charge.

Half of this payment will be returned if the drawings and specifications are returned in good condition to the Commissioner of Architecture, State Office Building, Albany, N. Y., within two weeks after date of opening bids.

Dated: June 5, 1933.

U. S. Government

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., June 21, 1933—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p. m., July 17, 1933, for furnishing all labor and materials and performing all work for the *extension and remodeling of the U. S. post office and court house at Eau Claire, Wis.* Attention is directed to the Act of March 3, 1931 (Public No. 798) relative to rates of wages; the Act of July 21, 1932 (Public No. 302) relative to employment of labor; the Act of March 3, 1933 (Public No. 428), relative to domestic materials; and the special conditions of bidding set forth in the specification. Drawings and specifications, not exceeding 3 sets, may be obtained at this office in the discretion of the supervising architect by any general contractor, and provided a deposit of $15.00 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, provided a deposit of $15.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (263)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., June 20, 1933—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p. m., July 18, 1933, for furnishing all labor and materials and performing all work for the *construction complete of buildings, wharf, grading, etc., at the U. S. quarantine station, Sabine Pass, Texas.* Attention is directed to the Act of March 3, 1931 (Public No. 798) relative to rates of wages; the Act of March 3, 1933 (Public No. 428) relative to domestic materials; and the special conditions of bidding set forth in the specification. Drawings and specifications, not exceeding 3 sets, may be obtained at this office in the discretion of the supervising architect by any general contractor, and provided a deposit of $25.00 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, provided a deposit of $25.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (262)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., June 19, 1933—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., July 24, 1933, for furnishing all labor and materials and performing all work for the *extension and remodeling of the U. S. post office at Logan, Utah.* Attention is directed to the Act of March 3, 1931 (Public No. 798) relative to rates of wages; the Act of July 21, 1932 (Public No. 302) relative to employment of labor; the Act of March 3, 1933 (Public No. 428) relative to domestic materials; and the special conditions of bidding set forth in the specification. Drawings and specifications, not exceeding 3 sets, may be obtained at this office in the discretion of the supervising architect by any general contractor, and provided a deposit of $15.00 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, provided a deposit of $15.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (259).

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., June 16, 1933—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., July 28, 1933, for furnishing all labor and materials and performing all work for the *construction of the U. S. post office at North Hollywood, Calif.* Attention is directed to the Act of March 3, 1931 (Public No. 798) relative to rates of wages; the Act of July 21, 1932 (Public No. 302) relative to employment of labor; the Act of March 3, 1933 (Public No. 428 relative to domestic materials; and the special conditions of bidding set forth in the specification. Drawings and specifications, not exceeding 3 sets, may be obtained at this office in the discretion of the supervising architect by any general contractor, and provided a deposit of $15 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, provided a deposit of $15 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (2510)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C,. June 19, 1933—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., July 14, 1933, for furnishing all labor and materials and performing all work for the *extension and remodeling of the U. S. post office and court house at Owensboro, Ky.* Attention is directed to the Act of March 3, 1931 (Public No. 798) relative to rates of wages; the Act of July 21, 1932 (Public No. 302) relative to employment of labor; the Act of March 3, 1933 (Public No. 428) relative to domestic materials; and the special conditions of bidding set forth in the specification. Drawings and specifications, not exceeding 3 sets, may be obtained at this office in the discretion of the Supervising Architect by any general contractor, and provided a deposit of $25.00 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any subcontractor or material firm interested, and to quantity surveyors, provided a deposit of $25.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (258)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., June 14, 1933—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., July 12, 1933, for furnishing all labor and materials and performing all work for the *extension of the U. S. post office and court house at Charlottesville, Va.* Attention is directed to the Act of March 3, 1931 (public No. 798) relative to rates of wages; the Act of July 21, 1932, (Public No. 302) relative to employment of labor; the Act of March 3, 1933, (Public No. 428) relative to domestic materials; and the special conditions of bidding set forth in the specification. Drawings and specifications, not exceeding 3 sets, may be obtained at this office in the discretion of the Supervising Architect by any general contractor, and provided a deposit of $25.00 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors provided a deposit of $25.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (256)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., June 13, 1933.—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 3 p.m., July 11, 1933, for furnishing all labor and materials and performing all work for the *construction of the U. S. post office at Ely, Nev.* Attention is directed to the Act of March 3, 1933, (Public No. 798) relative to rates of wages; the Act of March 3, 1933 (Public No. 428) relative to domestic materials; and the special conditions of bidding set forth in the specification. Drawings and specifications, not exceeding 3 sets, may be obtained at this office in the discretion of the supervising architect by any general contractor, and provided a deposit of $15.00 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, provided a deposit of $15.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (251)

TREASURY DEPARTMENT, Office of the Supervising Architect, Washington, D. C., June 26, 1933—Sealed bids, in duplicate subject to the conditions contained herein, will be publicly opened in this office at 10 a.m., or as soon as practicable thereafter, on July 17, 1933, for furnishing all labor and materials and performing all work for the *extension and remodeling of the U. S. post owce at Monroe, Mich.* Attention is directed to the Act of March 3, 1931 (Public No. 798) relative to rates of wages; the Act of June 16, 1933 (Public No. 67) relative to employment of labor; the Act of March 3, 1933 (Public No. 428) relative to domestic materials; and the special conditions of bidding set forth in the specification. Drawings and specifications, not exceeding 3 sets, may be obtained at this office in the discretion of the supervising architect by any general contractor, and provided a deposit of $15.00 is made for each set to assure its prompt return. One set will be furnished builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, provided a deposit of $15.00 is made to assure its prompt return. Checks offered as deposits must be made payable to the order of the Treasurer of the United States. Cash deposits will not be accepted. JAS. A. WETMORE, Acting Supervising Architect. (264)

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MANUFACTURERS of construction equipment and materials have taken advantage of the breathing spell that deferred maintenance programs have given them. When the railroads, Federal, state and municipal bureaus begin to release their backlog of orders they will find that these manufacturers have improved their time with well-directed technical research. New products have been developed. Old products have been improved. Future construction estimates will have to be planned with an eye open to the new economies of these new products. It will pay every engineer to familiarize himself with the products advertised in *Engineering News-Record* before writing his specifications for new projects.

June 29, 1933

JUL 1 1933

Engineering News-Record

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Also in this issue:

Sewers and Water Mains Laid with Relief Labor

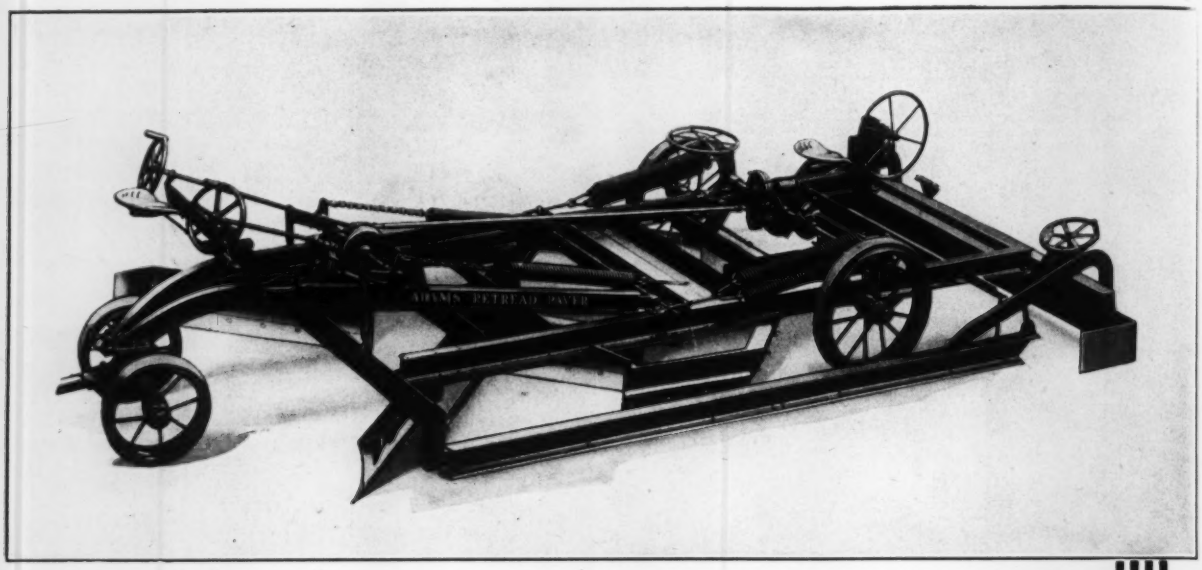
Grey Street Bridge, Brisbane—A Notable New Structure

Recent Areal Subsidence Revealed by Releveling

Continuous Beam Design by the Fixed-Point Theory

ADAMS RETREAD PAVER

for your "road-mix" work



Adams Retread Paver does two distinctly separate jobs at one time—first, it thoroughly mixes tar, asphalt and road oils with stone, gravel, slag, etc.; second, it distributes and levels the mixed material to specifications for compaction.

Three sets of mixing blades mix the material three times in one trip. Two or three trips result in a thorough coating of the aggregate which would require six to ten trips with a single blade machine. The material is not "wrestled" all over the road and scattered out of bounds—uniform distribution and straight edges are maintained.

A special and valuable feature is the independently controlled rear leveling and finishing blade which spreads the material exactly to desired width and cross-section, smooth as a floor, regardless of the irregularities or contour of the old surface.

Contractors and highway officials—investigate this machine before starting your "road mix" work. Inexpensive, easy to move, it does remarkable work at extremely low cost per mile. Write for special descriptive matter.

J. D. ADAMS COMPANY, Indianapolis, Ind.

MINNEAPOLIS	KANSAS CITY	SPOKANE
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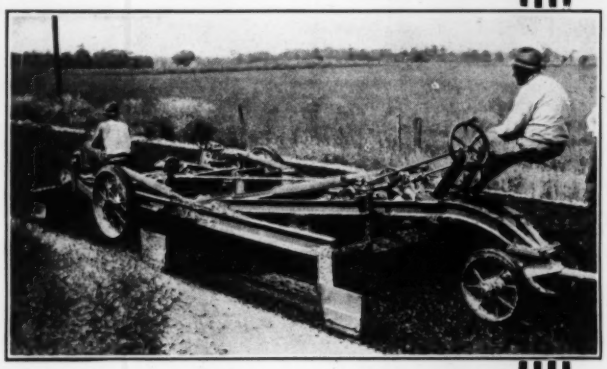
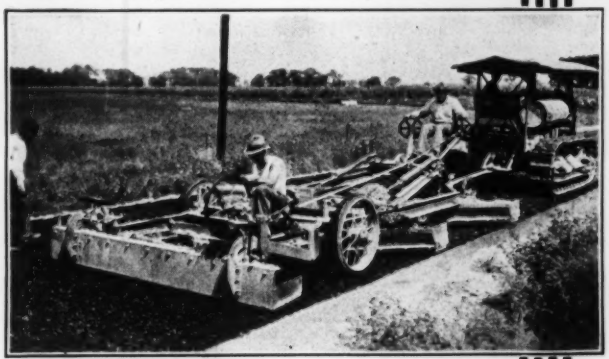
The Adams Line includes Leaning Wheel Graders, Motor Graders, Elevating Graders, Wagons, Road Maintainers, Plows, Scrapers, etc.



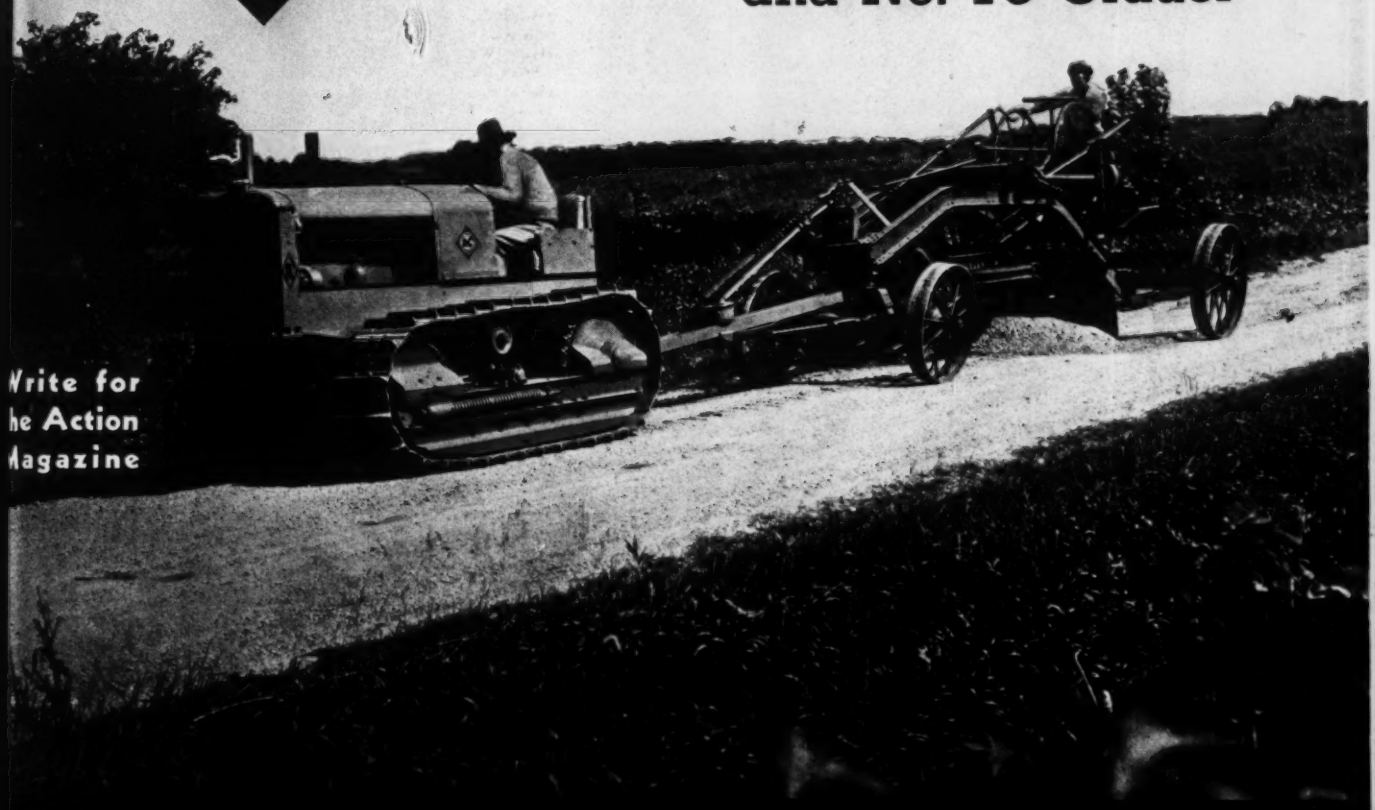
● *Three sets of mixing blades thoroughly mix the material three times in one trip. Aggregate is thoroughly coated while bituminous material is still in its most liquid state.*



● *Rear blade is instantly adjustable to compensate for dips in old road surface—new surface is perfectly smooth and level. Operator is guided in his adjustments by a large spirit level.*

ACTION

with the New A-C "K" and No. 10 Grader



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More Speed ... Proven Performance

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Koehring "Dumptor" manufactured by the National Equipment Corporation, Milwaukee. Equipped with 18 Timken Bearings.

18 TIMKEN BEARINGS in this KOEHRING DUMPTOR

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That's why more Timken Tapered Roller Bearings are used in the construction industry than any other type. It pays to specify Timken-equipped.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *Tapered Roller* **BEARINGS**